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Executive Report

maintenance: MIS prepares for a new era/49

In Depth Is your interface design using the end users?/65

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TOP OF THE NEWS

and for mainframes and minicomputers produces losses at Data General and Control Data, lower profits at Prime, Harris and Amdahl. Paga 158.

Europe gets an early look at Software AG's enhanced version of Adabas, to be uced to U.S. users in two weeks

AT&T discloses plans to provide T1 mul-tipleaces that are compatible with its Dig-ital Access and Cross-Connect System. Paga 19.

Psychologists preview microcomputer software for its case-of-use features. Page 35.

McDonnell Douglas Computer Systems reassures nervous users that it is in busi-ness for the long haul. Page 15.

Enhanced technology provides the boost in Prime's new top-of-the-line su-perminicomputers. Page 6.

IBM is withdrawing its once-popular Displaywriter from the marketplace.

After a long year of steep tosses, both in revenue and market share, Computervision Corp. will roll out its longawaited, open-architecture computeralded design and manufacturing system on Thursday. The Sun Microsystems, Inc.-based workstation, operating under the University of California at Berkeley Unix Version 4.2, will run the company's CADDS software for CAD/CAM applications, a spokesman said. The workstation is the first step in the company's 3-yearold product transition project, in which the company is porting its software from proprietary systems to industry-stan-dard platforms.

Newly named Cullinet Software Vice-Chairman and Chief Executive David Chapman, speaking at the ADAPSO See NEWS page 4

Distribution woes shadow show opening

Fewer product hits, retailer shakeout mark Comdex

By Eric Bender
ATLANTA -- The droves of comp resellers assembling at this year's Comdex/Spring do not expect drams from the hundreds of products that will bloom briefly and then mostly fade into anonym ity. Instead, the action will revolve around the turmoil in the distribution channel. The top item of conversation at the

show, which opens today for a four-day run, will be some major shake-ups likely to affect many corporate purchasers of minputers. The past month has featured buy-outs of the IBM Product Centers by Nynex Business Information Systems and of two major chains by Businessland. Inc. as well as a Chapter 11 filing by one of the three largest micro software distribu-tors, First Software, Inc.

As competition on the street in computer retail stores across the U.S. kee closing their doors. Estimates vary consid erably, but several observers predict that the overall number of stores will drop from 3,700 now to 3,200 by year-end. See DISTRIBUTION page 4

Fault-tolerant units key to **NCR** strategy

By James Connolly NEW YORK - Contending that it is moving away from the "monolithic main-frame," NCR Corp. last week introduced its version of the mainframe for the future, a modular transaction processor and general-purpose system with fault-toler-

NCR officials, including Chairman Charles E. Exley Jr., demonstrated the NCR 9800 at a New York press conference; several press conferences were also held in Europe and Asia. Exley said the 9800 lis multiprocessors supplants NCR's V-8600 line, which will receive a performance boost later this year and then will See FAULT-TOLERANT page 14

MCI files for virtual network

By Elisabeth Horwitt

WASHINGTON, D.C. — Going head to
head with AT&T Communications' Software Defined Network and U.S. Telecom. Inc.'s Virtual Private Network, MCI Com munications Corp. last week asked the Federal Communications Commission for Federal Communi mission to offer its customers Vnet, a virtual long-distance network.

Also last week, AT&T Communication

announced an average 10% price cut for SDN services, one of a series of cuts for its long-distance services, a move that analysts say will put greater pricing pressure on MCl and U.S. Telecom (see story page See MCI page 8

CW EXCLUSIVE

New Deal: Corporate users now playing with a full DEC

Sales are up, profits are soaring and Digital Equipment Corp. suddenly is the darling of Wall Street and the popular business press. The second-larg-est computer company is splashed all est computer company is splashed all over Business Week, The Wall Street Journal, The New York Times and other

The underlying reason for DEC's well covered financial success is more subtle than the steady increase in profits and revenue, DEC customers say. Product and organizational decisions DEC made years ago apparently are starting to pay

"Two years ago, there was a decent chance that as far as internal automati erned, we would walk away was cor from DEC entirely. We really just didn't see eye to eye on the need for interconnectivity, the impo tance of the workstation and the need to find a good use for the VAXs in a back room environnotes Don Awalt, corpote information systems director

at Reynord Automation.

Today, if I talk to people at DEC, we are pretty consistent in where the world is going," says
A walt, whose Hunt Valley, Md., industrial automation firm uses and also res DEC equipment. "They have changed

their strategy a lot, and they will ac-knowledge things like IBM PCs. . . . Our strategy is really starting to coincide

with DEC's strategy. One DP manager who saw DEC cut off future development for his Decsystem-20 mainframe in

1983 (see story page 121) is Frank Zazo, director of systems at Bantam Books, Inc. of Nev The decisions DEC made two

or three years ago to concentrate research and development on 32bit machines are starting to pay off," Zazo remarks. "We didn't like the decisions, and an awful lot of eye-

See USERS page 120

NEWSPAPER

IBM pulls its Displaywriter from mart, continues service

'It is anticipated that we will con-

lar IBM Displaywriter dedicated word processing system is being withdrawn from the U.S. marketplace, five years after its introduction, in favor of personal

IBM earlier this month informed its marketing channels that after July 1 no orders for Displaywrite will be accepted by IRM. Until then it

ay be purchased on a as-available basis It is anticipated that we will cost

tinue to provide service for the product for an-other six to seven to provide service for the product for anher six to seven - no IDM e when questioned ab rs can expect. The price of the dicated word processor was about \$10,000 for a be

As of the end of 1984, the installed base of Displaywriters was 133,600, according to San Jose, Calif.-based market researcher Dataquest, Inc. The following company figures re-flect cumulative deliveries in the five-year life cycle of the Display-writer: for 1981, 29,000; for 1982, 70,600; for 1983, 104,600; and for 1984, 133,600

According to Dataquest, before the Display writer went out of production in August 1985, another 21,000 were manufactured. They are most likely already installed, as IBM reportedly had an order backlog at the time, ac-cording to Pam Bliss, research ana-

According to Computerworld News Service, IBM recently made a

similar move in the UK, where its in the UK, where Its agents were told that marketing support for the Displaywriter would be withdrawn May 6. IBM reportedly intends to fill the

word processing needs of its British customers by running its Displaywrite software on its Per-Computer. Desktop/36 or Sys-

in the U.S., an IBM spokesman said that as a replacement for the discon-tinued Displaywriter, the company would consider a member of the IBM

PC family running our Displaywrite system software." It was also reported in the UK that IBM will drop Displaywrite 2 for the IBM will drop Displaywrite 2 for the PC in favor of Displaywrite 3, which offers greater compatibility with Dis-playwrite/36 for the System/36 and with Displaywrite/370 for main-frames. "We're still selling Display-write 2 here," said the U.S. spokesman, who added that IBM has no

In this issue

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Led by former Wang President John Cunningham, financially troubled Com-puter Corsoles hopes its three new products — a 15-MIPS Unix supermini,

a 5-MIPS Unix supermini and a RAM Disk option — will help reverse its fortunes/8 GM adopts Unix System V as standard

operating system for its manufacturing systems/ 10 Federal computer crime legislation is picking up speed in the U.S. House and

Senate judiciary committees/ 12 A computer industry analyst says office on has not hurt the overall employment picture for women/ 13 The McDonnell Douglas Computer Sys-tems users group, Micru, holds its an-

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MICROCOMPUTERS

searchers stress the importance or ware/ 35 Struggling to lift itself into contention in the intensely competitive business computer market, ITT's Information Systems Division introduces a family of

microcomputers aimed at multiuse and networking applications/ 35 SYSTEMS & PERIPHERALS

A commercial time-sharing but that bought a vector processing me-chine discovers that the benefits and problems can both be large/ 39 iTT Ourse adds two high-function termi nats to its line/39

COMPUTER INDUSTRY

Businessland stays on the fast track in the sluggish retail market by concen-trating on large corporata customers and value-added service/ 158 First Software Corp., once a high-flying microcomputer software distributor, last week filed for protection from its ditors in what some term a defense

against a takeover attempt by Solitaire EXECUTIVE REPORT



A dramatic transition is about to occur in computing, By 1996 more than half of the programmers in the U.S. will work on maintaining and enhancing existing programs and systems rather than on developing new ones. MIS managers nust prepare now for the transition. By Capers Jones/ 49

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High user overhead mars interface de-sign: Software that forces end users to sight their way through the programs in-stead of performing useful work ulti-mately fails. By Neal Margolis/ 65 aste makes wasted space: War stories abound that portray the mishaps of data center relocations. But in most in-stances, the decision to relocate or build a center is a thoroughly analyzed one in which careful planning is a must By Robert Halper / 75 OPINION & ANALYSIS

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DEPARTMENTS



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AT&T announces rate cuts

Affect high-volume, long-distance services

Elisabeth Horwitt In a move that will mean signifi

it savings to corporate customers d competitors. AT&T Communicaand competitors, AT&T Communica-tions last week announced price re-ductions totaling more than \$1.5 bil-lion for many of its long-distance

The reductions, which will take effect June 1, include decreased rates fect June 1, include decreased rates during daytime and evening hours for the following services: 11.4% de-crease for AT&T Long Distance; 12.8% decrease for AT&T WATS; 9.8% for the 800 service; 12.5% average decrease for Megacom; 12.4% av-erage decrease for Megacom 800; and 10% average decrease for Software Defined Network service.

The reductions result from the fact that local telephone companies have filed lower access charges than anticipated, AT&T spokesman Jim

There has been a lot of concern at AT&T Corp. that AT&T Communications' rate of return will exceed the 12.75% allowable return dictated" by the Federal Communications Commission, maintined Daniel Rosen baum, chief operating officer of Morristown, N.J., research company Winston/Smith Associates. "A lot of AT&T revenue for first-quarter 1986 was derived from AT&T Communica-

tions" be added

plans to discontinue it

The new cuts will "do terrible things strategically" to MCI Commu-nications Corp. and U.S. Telecom-munications, Rosenbaum continued. The two companies are currently ex-periencing upward price pressures owing to the fact that by September 1986, they will no longer be charged

55% less than AT&T for connection to the divested Bell operating compa-nies' customers, he added. The cuts are also a strategic n for AT&T because "they apply to big

ticket items used by big corporate customers — the major AT&T users," Rosenbaum noted. "AT&T is not Byrnes denied that AT&T was

"discriminating against any class of customer," pointing out that the cuts to Long Distance services benefit business and residential customers alike. "We pledged that as our price structure changed, we would pass cost savings on to consumers," Byrnes said. "We made sweeping s in 1984 and 1985; this year it len't as across the board but there is something for everyone.

CORRECTIONS

The headline for the article abou IBM haiting hardware enhancements for the 8100 Information System [CW, April 21] should have said that IBM is considering moving DPPX to 370 hosts

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Nynex buys IBM retail stores | Distribution woes

NATA complains of cross-subsidation

by Douglas Barney
NEW YORK — Last week's pur-chase of BM's 81 Product Centers by Nymex Corp. re-ignited complaints from computer dealers and the North American Telecommunications Asso-

on computer dealers and the North nerican Telecommunications Asso-tion (NATA) that rate payers are thing Nynex's diversification into profitable businesses, charges that nex officials deay vehemently. "We have made it crystal clear "We have made it crystal clear that there is no cross-subsidation. There are stringent federal requir-ments against that," said Steve Bor-net, a Nynex spokesman. The acquisition, expected to be complete by June 30, will give Nynex worst than 100 company-owned.

ore than 100 company-owns stores across the country, making it the third-largest company-owned computer retail chain behind Sears Conters and Co.'s Business Systems Centers and Businessland, Inc. Nynex already has 21 Datago business centers, and those, along with all IBM Product Centers, will be renamed Nynex Business Centers be-fore the end of the year.

NATA and many dealers are opposed to the acquisition, alleging that Nynex can use profits from its regu-lated operations to subsidize a highly aggressive strategy in its nonregulat-

ed activities like computer retailing.
"We have been accumulating evi "We have been accumulating evi-dence of cross-subsidation regarding the regional Bell holding company subsidiaries for about a month. We have a meeting scheduled with the Federal Communications Commission Federal Communications Commission on May 8, at which time we are going to present the evidence and discuss the practices of the regional Bell holding companies' computer shors." holding companies' computer shops," said Bernie Whalen, executive vice-president of the Association of Better Computer Dealers (ABCD), a Chica -based trade association.

Dealers fear that Nynex will inten

sify price competition among retail-ers. "IBM Product Centers have been a noncompetitive entity, but Nynex is extremely price competitive," said Gary Jacobson, president of Abacus II Computers, a Toledo, Ohio-based

ter dealer. at Nynex denies charges of over-

shadow show

From page 1

Even with this tumultuous backdrop, this week's show is expected to be more subdued than those in earlier drop, this week's show is expected to be more subdued than those in earlier years. The list of exhibitors has de-clined by about 50 from last year's 700, but show organizer The inte-face Group predicts a similar-size

tace uroup predicts a similar-size crowd, numbering more than 50,000. No product showstoppers are ex-pected. Many vendors, such as Apple Computer, Inc. and Microsoft Corp., are skipping the conference, while others that do show up are expected to concentrate on discussing upcoming shifts in distribution policie

ing shifts in distribution policies with their resellers. Among the hardware introduc-tions, IBM Personal Computer AT-compatibles will formally debut from NEC Information Systems, Inc., Panasonic Industrial Co. and Televideo

Comdex/Spring will feature the hardware products, led by various flavors of expanded-memory boards from AST Research, Inc., Quadram Corp., Tecmar, Inc. and others. Graphics add-ons also will be hot, with many recently unveiled offerings designed to be compatible with IBM's Enhanced Graphics Adapter. IBM's Enhanced Graphics Adapter.
Upgraded laser printers from AST
Research, QMS, Inc., Mannesman Taily and other suppliers also will get
much attention. The usual onalaught
of impact printers will be on display,
with one progressed. with one prominent introduction be ing 24-wire color printers from NEC

Information Systems that carry a starting price of \$849. Among the software items of in-terest, AT&T will demonstrate its previously announced Unix/OS previously announced Unix/OS Merge software for the PC 6300 Plus, which was unveiled in October 1985 and renamed Simul-Task.

Also drawing considerable atten-tion will be a number of recently intion will be a number of recently in-troduced or enhanced packages de-signed as add-ons for Lotus Development Corp. financial pack-ages, including a version of General Optimization's What's Best linear ogramming package that supports

Symphony. The conference kicks off today at 9:30 a.m. with a keynote speech by Robert Dilworth, president of Zenith Data Systems Corp.

TOP OF THE NEWS

NEWS from page 1 13th Annual Financial Forum last week, created a bit of a stir when he told financial analysts in a private session that the software vendor is developing a new ver-sion of Golden Gate.

Grid Systems Corp. last week was awarded a \$4.5 million contract to sell the U.S. Postal Service 1,800 Gridcase laptop computers, beating out IBM and a host of other laptop field players. The units will be used to track mail routing at several hundred major post of-fices across the country and are expected to cut both data entry ces of errors, accord time and chan ing to Postal Service representa-

COMPETERWOOD D

Sher in Chief

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find us to be the lowest price in town in any of our markets," said Edwin A. Schreiner, general manager of Nynex Business Information Sysns' Datago Division

tems' Datago Division.

But many remain unconvinced by the Nynex argument. "IBM computer stores have been losing money in a market already anturated with retail outlets for personal computer users. By adding these stores to Nynex's already poorly performing competitive subsidiaries, the company will have to cover even greater losses in the years ahead," said Edwin B. Spiewelt president of NATA. At radie asvack, president of NATA, a trade as-

of telecommunication Both ABCD and NATA are seekir ore regulation of the regional hold

Despite widespread reports of losses from the Product Centers, IBM is to have sold the Product Cen ters because they were no longer nec-essary as a channel of distribution. "The dealer channel has grown in size and matured so that now it pro

vides effective marketing coverage for IBM and full support for our cus-tomers," said Tom Mattia, an IBM spokesman. "The Nynex Centers will now become part of that dealer network." Mattis refused to com the profitability of the centers Observers, however, believe that the IBM decision to sell the centers

was based on the bottom line. was based on the bottom and. Why should they sell it if it was profit-able?" asked Carlos Frum. president of Northbrook Computers, Inc., a computer dealer based in Northbrook, Ill. Although refusing to comm

the financial status of the IBM Product Centers, Nynex's Schreiner took issue with reports of losses for the "The party line out on the street about the Product Centers certainly comes without a knowledge of what their actual performance was Their actual performance was quite

Nynex is just one of several Bell holding companies to throw its hat into the computer retail arena. Bell Atlantic Corp. last year acquired Compushop, Inc., a Dallas-based chain of some 60 stores. And the Pa-cific Telesis Group now has 13 Pactel Infosystems stores

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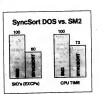
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One smart cookie deserves another

High-end units said to up performance 25%, 48% over predecessors

inued industrywide improve-is in emitter-coupled logic (ECL) nology and microcode enhancenology and microcode enhance its, Prime Computer, Inc. is sched

to announce replacements for high-end superminicomput The 9955 II will provide a 25% per-formance boost over the previous nts a 48% performance

according to Prime officials.

The older systems will remain available, although Prime's director of central systems marketing, Michael D. Harries, noted the older models provide less power for almost as much money. Upgrades from the 9850 and 8750 to their successors. nsist of replacing six CPU boards d cost \$75.000

Prime estimates that in a min ent, the 9965 II performs at a rate of 5 million

MIPS. The new systems also feature increased memory capacities. With the announcement, Prime will have replaced since October its entire 50 series of computer roc

entire 50 series of computer room and office environment processors. In addition, Prime is expected to announce a rack-mountable, 486th-byte disk subsystem that occupies one-eighth of the floor space used by Prime's complicate offerings.

Prime's previous offerings.
The company is expected to unveil
Syncsort/Prime, a version of Syncsort, Inc.'s mainframe-based sort, rge and copy program that has n designed for use on the 50 sc-

A beta-test user of Syncsort/Pri

said the sort program provided per-formance gains over Prime's earlier sort program, which is bundled with Prime's Primos operating system.
"We have been using it in our pro-

we nave been using it in our pro-duction area, where we do a lot of work with direct mail and need lots of sorts. Where it used to take 45 minutes to process 110,000 entries, we now can do it in 10 minutes," said we now can do it in 10 minutes," said Reilly Barry, director of software de-velopment for LSW, Inc., a Landover, Md., data processing company that provides mail and word processing services for clients that include the 11.8 Consense. S. Congress.

Barry, whose company runs a 9955, said he was unfamiliar with to-day's announcement of the 9955 II, but added, "The 9955 has done really but added, "The 9955 has done really well for us, but if they can make it 25% faster, that would be great. It has been a nice system and has stayed up well. Congress has a 99% uptime clause written into our corract, and the 9955 has been provid-

ing that performance fairly well."
He noted that Prime's addition of a rack-mountable disk system appears to answer the competitive challenge of third-party vendors that have tar-geted Prime's high-end disk system. The older drive, which will still be offered by Prime, is a Control Data Corp. Model 675 floor-mounted drive,

featuring a 1.2M byte/sec. transfer rate and costing \$30,000. The new drive, Century Data Sys-tems, Inc.'s AMS 315, costs \$15,000, or \$24,500 with a controller, and features a 1.8M byte/sec. transfer rate and a 20 msec average seek time. The new drive uses an Intel Corp. 80286ed controller that can manage up to four disks, while each computer

supports up to four controllers. The 9755 has a cycle time of 80 nsec, compared with 100 nsec for the 9750, while the 9955 II has a cycle time of 64 nsec, compared with 80 nsec for its predecessor

The 9955 II. with 32M bytes, also features double the main memory of the 9955, while the 15M-byte maximum in the 9755 represents a gain over the 12M-byte limit in the 9750. The new models feature higher I/O bandwidths than their predecessors, M byte/sec. on the 9755 and 9.5M byte/sec. on the 9955 II.

The new systems, which Harris said were designed to compete with Digital Equipment Corp.'s VAX 8500 and 8650 and IBM's 4381 line, run Primos Revision 20, which was intro

A 9755 with 8M bytes of memory starts at a cost of \$208,805, while a typical configuration with Primos, a diagnostic processor, two disks, a streaming tape subsystem, a periph-eral cabinet and a color console costs A 9955 II with 16M bytes starts at

A 9955 II with 16M bytes starts at: \$22,355, while a typical system with Primos, a diagnostic processor, two disk drives, a tape subsystem, a peripheral cabinet and a color con-sole costs \$392,600. Syncsort/Prime is user-installable and requires Pri-mos Revision 19.2. It costs \$7,000 for nputer-room systems and \$3,500 for office systems.

Prime also is scheduled to ance an average price cut of 16% for its entry-level computer roc



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Emphasizes firm's marketing strategy.

management team

By David Bright BOSTON — Led by former Wang Laboratories, Inc. President John Cunningham, ancially troubl y troubled Comput-es, Inc. (CCI) hopes that two Unix superminic puters introduced last week will help reverse its fortunes

Presiding over the intro ductions, Cunningham confi-dently outlined the compa ny's strategy and crowed about the management team he has assembled since be-coming chairman last July. The company unveiled a 15 million instructions per 32MP and a 5-MIPS Power 6

32E, along with a RAM Disk ment and solid user base, etary technology and empha sis on software, sets it apart from the many Unix "hot-box" companies, said Craig an analyst at the tner Group, Inc. in Starn-

They've got some market ches, some horizontal ap-ications software and some vertical applications soft-ware. It's increasingly the the

CCl's added value, accord-ing to Kimball Brown, an an-alyst with Dataquest, Inc. in San Jose, Calif., is its ability to use efficiently the older Schottky transistor-to-tran-sistor logic technology to provide good price/perfor-mance CCI also has a welllaid-out marketing strategy. rown said, but he was most impressed with the compa-

ioned companies in the Unix marketplace. - Craig Symon

ny's management tram.

The high-end Power 6/
32MP is priced at \$290,500
for a system with 6M byten
of error-checking and control
random-access memory and a

Perpos operating system (CCI's system based on ATAT's Unix System V) li

Using proprietary dual processors in a master-slave relationship, the system produces nearly twice the power of the Power 6/32, which is

The second superminicom-iter introduced, the Power 6/32E, is positioned between CCI's entry-level Power 5/32 system and the Power 6/32. At \$124,950, the 5-MIPS system supports up to 100 users and can be upgraded to an 8.1 MIPS Power 6/32. The RAM Disk option is

available on all of the company's systems. Priced at \$105,600 in a 32M-byte imntation and expandable to 64M bytes, the board set was designed to speed the access of frequently used data. Its claimed average ac cess time of less than 1 msec is about 30 times faster than that of a real disk drive. The Power 6/32E is avail-

able now, RAM Disk shipments begin in June and th Power 6/32MP is schedu fourth-quarter

availability.
While CCI in 1985 lost \$111.9 million and lost \$5.6 million in the first quarter of 1986, Cunningham predicts that the company would break even in the second quarter and become profitable for the year.

CCI, headquartered in Waltham, Mass., is solidly based in the telephony market. The company's special-ized automated directory assistance systems reportedly have enabled it to capture 65% of the U.S. directory as sistance market.

MCI files for

virtual net

The Vnet service would enable MCI customers to access its public dial-up net-works through direct, dedions. Vnet wili cated connecti offer potential cost savings to firms whose internal comunications make up at least % of total calls, MCI said. The greatest Vnet use

will occur in hybrid net works consisting of both leased lines and virtual links," said Amy Francis, an analyst at Boston consulting npany the Yankee Group She said customers will use Vnet to bring remote sites that do not generate enough traffic to justify a leased-line

MCI first announced Vnet at the International Commu-nications Association conference in May 1985 and has spent the interim "getting the bugs out," product man-

ager Peggy Knight said. The service is currently being beta tested at two sites. Customers can save up to five cents per minute by by passing the local telephone company's central office switching facility, Knight

said, based on an estimated 8½ cents per minute local dial-up access charge vs. two cents to three cents per min ute charges for a fully uti-lized leased line. Customers can also realize volume dis-

counts based on their total mber of monthly calls for all sites AT&T's SDN service do lling on a site-by-site basis, offering customers less op-portunity for volume dis-counts, Francis said. U.S. Te-

lecom's VPN service offers bulk discounts for all sites Other Vest offerin

Other Vnet offerings in-clude network management and accounting capabilities such as call detailing and cost allocation, typically available only on private net-

"Private-line prices expensive and getting more so; and since divestiture, cus tomers have had to lease their lines from more than one vendor," MCI's Knight "Vnet lets companies have leased-line network management features with greater cost-efficiencies.

Vnet is "not designed to support high-speed data transfer," Knight said. Vnet customer access lines are conditioned to support reli-able high-speed data trans-missions; but once they reach MCI facilities, tra travel over dial-up lines.

The same is true of other carriers' virtual network of-ferings. "Even AT&T won't give a top data speed for SDN," Knight said. Vnet

good switched network will support; certainly full du-plex 2,400 bit/sec."

AT&T spokesman Jim Byrnes said that AT&T's SDN service "will support ssion rates of up to 9.6K bit/sec., the upper limit of a switched network." He added, "AT&T has always said SDN is primarily a voice service, but it is also a fore-runner to Integrated Services Digital Network

Users will have to wait for the carriers to get their digital switches in place" be-fore high-speed data rates ne widely available over virtual networks, Francis said. "AT&T will probably be the first to offer those rates," sbe added.

SDN, which became a tar iff offering Nov. 4, 1985, offers a broad range of man agement and accounting features including traffic reports, hourly profiles on in-coming calls, total time per call and customer access-line stenance, according Service Marketing Manager Richard Simonson. AT&T also maintains a

data base of network management and accounting in formation for each customer, he added ATAT files for SDN enrichr

AT&T recently filed with the FCC several "enrich-ments" to the SDN service, including off-network-onegress-busy, enabling cusers to reroute incoming calls over the local telephone company's dial-up when the dedicated line

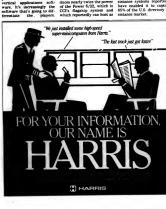
overloaded.
Another FCC filing reests permission for AT&T to provide international ac via SDN. MCI already has PCC approval to provide Vnet users with access to its international network

According to Francis, the carriers are using their virtu-al networks to "lock customers into a one-vendor service solution. When you sign on to a virtual network, you don't lose the ability to use other carriers, but you lose the incentive because your volume

scount decreases." She added that regi holding companies should be gin to offer virtual network services that "should eventu ally enable customers to ac-cess their choice of long-distance virtual network

MCl charges \$5,000, plus a \$2,500-per-month basic charge. MCl said it would waive both charges for the period of September this year through May 1987. SDN requires an initial installa-tion fee of \$105,000 plus

\$1,000 per site. "SDN offers cost breaks over existing private net-works in the upper price range," Simonson said. He added that typical private network costs run from 18 cents to 38 cents per minute.



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GM steers vendors to Unix as manufacturing standard

WARREN, Mich. — Gener-

al Motors Corp., which forged a standard with its Manufacturing Automation Protocol (MAP) effort, has informed vendors that it will adopt the AT&T Unix System V or a certified equivalent as the standard operating sys-tem for use by its manufac-

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turing systems.

A written notice was sent to manufacturing system vendors earlier this year from the automobile maker's Computers in Manufacturing Steering Committee that outlined the steps GM will take to help expedite the efforts to establish a Unix standard. We needed a common operating environment," said John Williams, a senior manufacturing project engineer at GM who is chairman of its recently formed Unix System implementation Task Force.

"Not only do we have many different vendor's operating systems, but some of our vendors have many dif-ferent operating systems. And we have different ver-

sions of those multiple oper-ating systems. We also have some of our own in-house systems, too," he said. Unlike the MAP effort,

there have been no formal ouncements from vendors in support of this effort. "I'm not sure they'll pub-licly announce it," Williams said. "But we'll see it in their product lines. Lots of compa-nies are going in that direction anyway, like DEC with Ultrix," he sald, referring to

Digital Equipment Corp.'s version of Unix, "and IBM's commitment for its big sys-An IBM spokesman noted that IBM has made versions of Unix available on some

systems, but he declined to characterize those offerings as an overall commitment to

The decision to move to one operating system was made more than a year ago. A number of operating systems were reviewed, including Pick Systems' Pick and Mi-crosoft Corp.'s MS-DOS, ac-cording to Williams. made more than a year ago. A

We saw that a lot of cor

panies were moving to Unix," Williams said. "We ourselves are not experts in it yet. But all those compa nies can't be wrong." Since GM's official an-

nouncement in February, its task force has been involved with the Institute of Electrical and Electronics Engineers (IEEE) committee working toward a national Unix stan-dard. It has also planned a se-ries of symposiums, two of which have already been held, to bring users and ven dors together to discuss the evolving Unix standard. Jim Issak, chairman of the

fical name for the Unix stanpects a final version for Unix, or Full Use Standard, to be established by late 1987.

Meanwhile, the IEEE has issued a Trial Use Standard that provides a reference to a system interface for pro-grams written in the C lan-guage so that applications can be ported at the source level between conforming im

plementations of Unix with minimal effort. Issak said he does not ex et vendors to release prod ucts that conform to the Trial Use Standard until the end of 1986. Meanwhile, there are a number of other issues that have yet to be resolved be-fore they can be applied to the Full Use Standard.

For instance separate nittees within 1003 are working on final specifica tions for the shell and tool tem as well as on specificaing features

Amdahl adds storage module to disk line: improves terminal response time tenfold

> titioners of on-line transac tion processing.
> The 6680 uses solld-state semiconductor memory, im-plemented in 256K-bit dy-

ry chips, to provide data accesses averaging 0.3 msec, said Don Feinstein, Amdahi's

storage products manager. In contrast, the 6380 family's access times typically range

grate their performance-oriented data to a separate box, EDAS frees up spinning me-dia to do the things that they do best," Feinstein said.

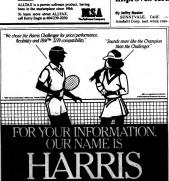
Although Amdahl itself is already using several of the 6680s in-house, the product has yet to find its way into any beta test sites, he added.
"Most companies that deal

with on-line transactions, in-

cluding airlines, are always looking to improve their ter-minal response times," noted Art Landman, vice-president

om 27 to 34 msec. "By allowing users to mi

cess is critical



(I) HARRIS

plemented its existing disk systems line with the addicific Southwest Airlines, Inc (PSA). Although PSA uses Am tion of a nonrotating exter-nal storage module that reportedly improves terminal

dahl mainframes, its DASD devices are obtained from Memorex Corp. Its need for a sponse times tenfold in apcations where fast data ac-6680-like storage unit is still practically nonexistent. "Our system already consistently firm's 6380 series of IBM 3380-class disk units, the 6680 Electronic Direct Acprovides response times of one to two seconds," Landin said. "How do you im cess Storage (EDAS) product is targeted at intensive pracprove on that?

A basic EDAS configura tion incorporates a Model 6880 Storage Control Unit (SCU) and one 6880 Electron-ic Storage Unit (ESU) ranging in capacity from 64M to 256M bytes. Every SCU sup-ports up to two ESUs, for a total capacity of 512M bytes; and can be configured with one to 16 logical, 3380-for-mat volumes, each varying in size from 1M to 128M bytes.

A maximum EDAS system is achieved by adding a second SCU and at least one op-tional Model 6681 Battery Unit to the minimum configu

The addition of a second controller — plus Amdahl's optional Quad Extended Pathing (QXP) feature — creates four independent paths to each logical volume. Each path transfers up to 3M byte/sec., for a maximu gregate throughput of 12M byte/sec.

Shipments of the 668 which ranges in cost from \$325,000 to \$1.2 million, begin this quarter.

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Congress accelerates action on computer crime legislation

Proposes federal authority extension

By Mitch Betts WASHINGTON, D.C. Congressional action on com-puter crime legislation began to pick up speed last week as the U.S. House of Represen-

tatives' Subcommittee on Crime approved a compro-mise bill that would assert ral jurisdiction over cer-interstate computer

The bill, which refines and builds on the 1985 crime stat-ute that covers only federal computers, would expand for

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diction to computer crime involving private-sector com-puters in two or more states It also hits so-called "pirate alletin board systems that

xchange computer pass Because the proposed Computer Fraud and Abuse Act of 1986 also has support

from the Department of Ju tice and key members of the mittee, the bill has a greater chance of passage than simi-lar efforts of the past few

Rep. William J. Hughes (D-N.J.), chairman of the House erime subcommittee, said he spent the last six months ne-gotiating with his Senate counterparts to arrive at the consensus bill, which his panel approved in a quick

In the Senate, where the bill is sponsored by Sens. Paul S. Trible Jr. (R-Va.) and Paul Laxait (R-Nev.), chairman of the Senate's crime subcommittee, the hill will be ded soon to the Senate Ju

jary Committee's crowded

At a recent Senate hear-ing, the general thrust of the legislation was endorsed by the Virginia Bankers Associ-

ation. John J. Sponski, group

The bill would expand federal jurisdiction to encompass com puter crimes in-volving privateector computers in two or more

states. executive officer in charge of data processing at Sovran Pi-nancial Corp. in Norfolk, Va., said the federal legislation is needed to discourage com uter crimes that cross state undaries.

Specifically, the pending mouter crime bill would

make it a federal offense to access a computer in a fraudulent scheme to steal and destroy computer data, hard-ware or software without au

These offens These offenses apply to mputers used by the feder al government and federally insured financial institutions and cases in which comput ers in two or more states are

Furthermore. makes it a federal misde meanor for an individual to traffic in computer pass words belonging to others, if there is a clear intent to de-

Another bill affecting computer crime, the procations Privacy Act, is sched uled for action this week in the House Judiciary Committee's Subcommittee on Courts, Civil Liberties and the Administration of Justice. That bill outlaws the interception of data communi-

Leading software researchers label Reagan's Star Wars plan 'technologically infeasible'

statement calling the Reagan administration's Strategic Defense Initiative (SDI) weapons plan "technologi-cally infeasible" because it would require computers of "unprecedented complex-

The statement was signed by 36 of 61 researchers attending a recent workshop on fault-tolerant distributed

computing. Signees included represer tatives from the IBM Aima den Research Center, IBM's relational data base research and development facility in San Jose, Calif.; Tandem

Computers, Inc.; Digital Equipment Corp.; Xerox Corp.; AT&T Bell Laboratories; the Wang Institute; and several leading university computer research programs.
The SDI plan, popularly
known as Star Wars technology, is intended to develop a

computer-based defense system located in space to pro-tect the U.S. from a nuclear Although the SDI plan has

been a research contract bo-nanza for many computer firms specializing in defenserelated technology, a grow-ing number of academic and corporate researchers have contended that the plan would require unforeseen adces in current hardware

"No large software system like this has ever worked successfully its first time,

way to perform full scale op-erational testing," said David Redell, a member of the ad hoc group and a researcher at DEC's systems research center in Palo Alto, Calif.

The statement signees, mainly specialists in software for the fault-tolerant environment, say SDI re-quires unrealistic advances in current software technol

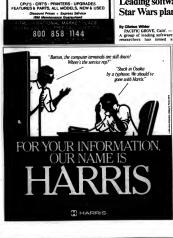
The system is sup to combine distributed computing, fault tolerance and real-time response," Redell said. "Those three would tend to interfere with each

other Redeil said the position statement grew out of spontaneous discussions on SDI software requirements at the conference. He said the signees have no plans to orga-nize any further action and are not affiliated with Computer Professionals for Social Responsibility, a Palo Alto based professi

The statement reads, "The

effective defense from nucle

ar annihilation of the lives homes and property of the American people, as embod-ied by the Strategic Defense Initiative (Star Wars), re-quires highly reliable computer systems of unpredented complexity. As experts in reliable computing, we strongly believe that a system meeting these requirements is technologically infeasible."



Clerical growth slowing as women move upscale, study says

Group insists women not 'hidden victims' of office automation

By Mitch Betts WASHINGTON, D.C. -- Seeking to dispel the notion that women are los-ing jobs as a result of office automastry trade group last week released a study asserting that the declining growth in clerical em-ployment results from women moving into upscale managerial and tech-

The Computer and Business Equipment Manufacturers Associa-tion (CBEMA) study was intended to answer charges made by 9 to 5, the National Association of Working Women, that women clerical workers are the "hidden victims" of office automation because the growth of women-dominated clerical employ-

Paul A. Stra analyst who wrote the CBEMA study, countered that 639,000 new strative and clerical support

Under questioning, Strassr Under questioning, Strassmann ac-knowledged that computer technol-ogy is dampening the growth in wom-en-dominated clerical jobs, but he stressed that, overall, women are making major advances in the labor

The slowdown in the creation of "The alowdown in the creation of administrative support lobe is actual by a massive movement by women to upgrade their social and economic status," Strassmann's study conclud-

ed. He cited government statistics showing that women acquired 61% of the 5.5 million new managerial jobs created in companies since 1968 and that the distribution of women in office jobs now favors managerial and

"Women are migrating from ad-inistrative support and cierical jobs

executive, administrative, mana-erial and sales jobs," reported trassmann, an and former con-sultant for 9 to 5, said he is skeptiauthor, retired Xerox Corp. ex-ecutive and forcal of the sugges-tion that clerical Women acquired r MIS execuworkers are be

61% of the 5.5 million new However, un der questioning at a press confer-ence, Strassmann said he does not managerial jobs created since 1958.

cerned that office automation whether women get

is being implemented in a top-down fashion, and clericals are not being trained for the new jobs," he maintained.

According to the U.S. governting the opscale jobs are clerical workers being promoted or new re-cruits with college degrees. He said

ment's Bureau of Labor Statistics, job positions for administrative support, including those for clerical workers, will grow only 10% from 1984 to 1984 companyed with 525 or 1984 to 1994, compared with 25% growth re-ported for the years from 1973 to

In absolute numbers, however, clercial jobs will increase by roughly two million from 1984 to 1995, the The Bureau of Labor Statist

The Bureau of Labor Statistics em-ployment forecast reported that the office jobs hardest hit by computers will be stenographers, statistical clerics, telephone operators, payroli clerics, mail clerks, typists, file

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Fault-tolerant units key to NCR

se phased out in favor of larger 3800s.
"It represents a major departure from the architecture that NCR has used before. I think it is going to im-prove their ability to protect their in-stalled base of locations that require stalled base of locations that require fault tolerance. It may very well give them the ability to compete for new transaction processing applications where what I call graceful growth, the ability to expand on-line, is an issue," observed Omri Serlin, owner of Itom International, a Los Altos, Itom International, a Los Altos, indiging in transaction processing.

The 9800 line includes six models a present, ranting from the 981 is a present, ranting from the 981 in the processing.

The 9800 line includes six models at present, ranging from the 981 i with one application processor and one data storage processor, to the 9884, consisting of eight application processors and four data storage processors. NCR plans to extend the line

cessors. NOR plans to extend the line to a maximum of 16 application and eight data storage processors. The 9800s will be aimed at NCR's existing user bibse, particularly in the retail, financial and manufacturing fields, and at new markets that it hopes will develop. The company em-phasized, however, that the 9800 is a eral-purpose computer, not exciuvely a transaction processor.

NCR officials said the company will use a dedicated sales force to try to reach those new markets, which include new applications within its retail, manufacturing and financial reass, manuscuring and financial base and developing markets such as real-time processing of medical re-cords. The company will adopt the strategy, NCR officials said, that in-volves selling the 9800 with packaged software solutions but also as a elopment tool for users to generate new applications.

Exley said that such "tool" sales

can generate volume production.
"New products should be aimed at big market opportunities, and our products should be based on common products shown to used on columns basic processor technology platforms as far as is practical. This maximizes volume of the basic platforms, reducing manufacturing cost and increasing the yield from development spending, "Exley commented. NCR Assistant Vice-President for

neral-purpose systems John R. what he calls a mainframe is signifi what he calls a maintraine is signili-cantly less powerful than other ven-dors' high-end offerings, noted: "The NCR 9800 is not just another main-frame offering improved perfor-mance, it is the end product of the evolution of the monolithic main-frame into a more flexible, practical ical way to pro

Scorsone emphasized the 9800's ability to grow by adding slices of power to the 32-bit very large-scale power to the 32-bit very large-scale integration system and its use of an open architecture. The system con-sists of loosely coupled combinations of rack-mounted application proces-ors and data storage processors con-nected on a 6M-byte, carrier-sense multiple access with collision detec-tion bus and housed in stackable 22-to. by 28-bit colors processors unit he

The application proce ons, while the data storage

processors manage trieval. Each process up to 4M bytes of me

storage processors support 3M bytes of cache and 3.2G bytes of disk stor-age. A minimum fault-tolerant con-figuration would consist of two apfiguration would consist of two ap-plication and two data storage processors, would allow all system memory and other memory selected by the user to be mirrored on sepa-rate disks and would keep copies of each application on each application or. If a component

me its duties. Scorsone said VRX/E, a new ver-sion of NCR's proprietary operating system VRX, was designed to support the fault-tolerant capabilities and on-line transaction processing with none of the system components standing idle during normal operation. cilities and software de houses, and that volume

houses, and that volume empments will begin during the fail.

The company said a 9884 performs up to four million instructions per second (MIPS) in a batch environ-ment and 8 MIPS in a transaction prosing environment. That same system runs 52 transactions per second in a debit-and-credit benchmark, according to NCR.

A basic 9811 system consisting of A basic 9811 system consisting of one application processor, one data storage processor, VRX/E, a system console and 280 bytes of memory per processor costs \$41,220. A 9884 with eight application and four data storage processors, 4th bytes of memory per processor, VRX/E and dual consoles costs \$340,580.

Several NCR users contacted last

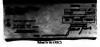
week said they were unfamiliar with the details of the announcement, while several others said they al-ready have committed to leaving NGR for IBM equipment. However, Joseph J. Balaza, vice-president for MS at Frisch's Restau-rants, Inc. in Cincinnati, said the rants, Inc. in Cincinnati, said the fault-tolerant feature is something that "everyone would like to have if they could afford it." He said of the 8900, "We would consider it if we had the need, which does not exist right now." Frisch's uses a V-8575 for general accounting and field oper-

Another DP manager, who uses NCR equipment but asked not to be identified, noted that the 9800 does not address his needs because his company has committed to Unix-based systems, and that the 9800 is aimed at the VRX market.

The only breaks printers are the









- When you buy a Xeron printer, what you get are askitheruphs. Not breakdowns. You see, Aren has been a leader in developing he frieng, reliable printers from the very beginning. We cancel dissivated opinities, mounted the support One of our latest printing. However, the subject week, but rather lower prices. Became from now and hely 31 see he officient, as the control of Aren Diabelo der mann is

- So you'll be sade to save from a the model you choose.

 And choosing a casy since all o compatible with a wide range of pens Xerox, Apple and IBM.

 Our Xerox Diablo dot matrix p
- Our Xerox Diablo dot matrix printers let you print in near letter quality, or high-speed draft quality. And graphes can be morged right in with the text.

McDonnell Douglas allays users group fears of revamp

Micru meeting leaves attendees relieved

By Donna Raimondi CAMBRIDGE, Mass

of the annual meeting of McDons Douglas Computer Systems Co. in pendent users group, Micru, worr 's reorganization efforts, last week heaved a coli sigh of relief when assured that the my intends to stay in business

"I got worried because they lopped off a lot of their sales people in the New York area and there was talk of a sale or Chapter 11 proceedings,"

of computer consulting at Winthrep Brown & Co. in New York, and one of 200 uners attending to the

But in a speech before the users group, Robert Pischer, group execu-ive officer of McDonnell Douglas' In-formation Systems Group, assured

ormation systems Group, assured rown and the other users that the buppany will continue in business. The McDonnell Douglas Informa-ion Systems Group, a 51 billion little rother to the \$10 billion McDonnell Douglas Aerospace Group, is going through an intensive reorganization designed to streamline its functions, et costs under control and update its oninment and services, said Peter

McDonnell Douglas announced a sw president of its Computer Sys-ms Co., Otis Brinkiey, a few weeks to. Brinkley, who has a marketing

, who has a man-cering background. ring the Mitru conference, Mc-ell Douglas informed users its immediate plans to bring in warket dea new team to develop and market d

pand from its traditional small and dium shop niches. The Information Systems Group lost \$109 million last year, in large rt because of costs associated with e acquisitions and reorganizations

XFROX

XEROX

of Tymshare, Inc.'s Tymshare and Tymnet services. This year will be devoted to reorganizing, and the com-pany intends to be in the black some-time in 1987, officials said.

Uners said they were sen users said they were sensitive to the company's condition. "McDonnell Douglas lost over 50% of its people — sales, some marketing and mainte-nance staff — in my area. They told where they they area. us here that the cuts are part of an ef-fort to get good people; that that branch was not meeting its expecta-tions," said Susan Nazath, architectural associate at Swanke Hayden Connell Architects in New York. Nazath is manager of her firm's 80-user McDonnell Douglas M9250

supermini, used for administrative and design functions. The reorgani-zation is tough, but I think it is good. I've been reassured about McDo Douglas now," she said.

Company finance was also a con-cern for two-term Micru President W Kent Nickerson. "Fischer assured us

The reorganization is tough, but I think it is good. I've been reassured.

— Susen Naz nke Hayden Connell Archiv

you'll get on Xerox ones you want.









and I-800-TEAM XRX at 1544

that McDonnell Douglas was in this for the long term. I feel comfortable about it because they are putting to gether a viable structure, Nickerson's company, the American Egg Board in Park Ridge, Ill., runs 23 inals and three printers on an 6000 minicomputer

Both Nickerson and McDonnell Douglas' McGuirk said relations between the users group and the ven dor have not always been cordial Micro started out on an adversarial basis. It was a defense. The only way to speak to the company a few years ago was in numbers," McGuirk said. Relations have improved to the point where about 75% of the recommendations made by users through a special program are actually implemented by the vendor. Nickerson added.

Along with the company reorg zation, there is also a Micru reorgani-zation of sorts going on, Nickerson The shows were so much the same that people stopped coming, but this year we had four tracks run like labs. We hope to get some of those people back with this format."

Robert Walker, manager of prod-ct marketing at McDonnell Douglas, uct marketing at mcLonnen Douglas, said that the company was a leader for years in the Pick Systems Pick-based field, with 8,000 installed sys-tems worldwide. "We slipped a little over the last few years," he said. "Ultimate Corp. came along and took a big share, but we feel we are in a po-sition now to take back a leading

To that end, the company has revamped its computer line, with sev-eral systems, including the high-end M9250 and the entire M9200 line, debuting in the past year. An M6640 the next couple of months, and three during the next year, according to



EDITORIAL

Perspectives on Star Wars

As the tragedy of the Challenger space shuttle disaster unfolded on our TV screens we were reminded again and again of the perociated with even the most carefully ucted products of our technology.

Now a group of 36 computer scientists at-tending a conference on fault-tolerant com-puting have issued a statement contending that the systems required to many contending puting have issued a statement concenting that the systems required to manage the Rea gan administration's Strategic Defense Initia-tive — sometimes called Star Wars — are so complex as to be "technologically infeasible." complex as to be "technologically infeasible."
These leading computing professionals, expert in issues of reliable computing, come from the R&D groups of such leading vendors as IBM, AT&T, Wang Laboratories, Inc. and Digital Equipment Corp. as well as from uni ity computer inhoratories.

three years ago, we have heard much rhetoric, pro and con, from politicians, generals, peace activists and the like — advocates who have, in the main, debated the proposal's military and political consequences. Only in re-cent months have we begun to hear the voices of technologists who, with the force of their training and experience, are asking the ques tions that, to our way of thinking, make up the crux of the debate

What does the experience of computer processionals tell us about developing and important complex, large-scale computer st puter systems? Is it possible to build error-free programs using artificial intelligence techniques? How do we test systems, short of engaging in the nuclear battles they are intend-ed to prevent? What are the consequences if we don't test? Are they worth it? Are there alternatives?

The awesome military and political conse-quences of the SDI proposal demand full and open public debate, a debate that goes beyond the positions of hawk vs. dove, Republican vs. Democrat, pro-Reagan vs. anti-Reagan. The DP community is uniquely positioned to bring to the debate a clear understanding of the technical problems inherent in such a plan, as well as possible solutions to those problems. We applaud those who have joined problems. We applaud those wno mave posputer professionals to do the same.

Notes & observations

From an article in the Winter 1986 issue of Issues in Science and Technology, by Henry Geller, former (1964-70) general counsel of the Federal Com unications Commission nes the following: "Today the telecommunications policy of the U.S. government is at odds with the driv-

ing technology in major respects and should be drastically revised. The existing policy hars roughly one-half of the U.S. tele munications industry from competing effec-tively with its rivals in the telecommunications and information services market, a jucrative, dynamic field whose size and importance cannot be overestimated. . . . Failure to change the government's restrictive policy will mean the loss of economic and so-cial benefits to the nation. Major telecommunications companies that were once part of AT&T's Bell System will remain barred from competing effectively in both the do-mestic and world markets."



LETTERS TO THE EDITOR

LU6:2 deserves detailed analysis

An instant Analysis by Atul Kapoor found in the Communications section [CW, March 24] merits comment: "LU6.2 is a complex architecture with a iot of overhead. It's fine for complex interactio between processes or real-time communication be-tween intelligent systems. But for simple file re-

trees institigent systems. But for simple file re-reveal of for FC communications, its overfull, and unfortunately, you can't implement a subset of a Che and officially implement a subset of the Che and officially implement a subset of files the functions of LIAE2 in terms of true files the functions of LIAE2 in terms of true files the functions of LIAE2 in terms of true sets. "Implementors can choose only those option set that are required for their particular applica-tion of the LIAE2 of LIAE2 in the second of the communication of the LIAE2 of LIAE2 in the LIAE2 of LIAE2 of LIAE2 in the Seammatter, the Dipplaywriter, Specien/SIG CPP and APPLICE and of LUB.2 are IBM's CICS 1.6, the Scanmaster, the Displaywriter, System/38 CPF and APPC/PC and Digital Equipment Corp.'s Decnet SNA Gateway APPC support. Many other companies such as Wang Laboratories, Inc. and Tandem Computers, Inc. will soon be providing products that imple ment LU6.2 sub

 LU6.2 has the lowest protocol overhead of any LU type within SNA and also lower than nearly any other program-to-program connection tech-nique, such as virtual terminal. For IBM users, it is important to know that LU6.2 has at least 50% less overhead than 3270 or RJE emulation when use for program-to-program con unication, its pur-

■ LU6.2 was created out of nec had to be a simple, low-overhead method of com-municating between systems. That it why it is used on IBM's Token-Ring local-area network for operations such as file retrieval and why IBM reoperations such as file retrieval and why IBM re-fers to it as its "strategic" interface for Personal Computers and other systems. LU 6.2 is often the most simple technique possible and is not "over-kiii" for simple applications.

LU6.2 does have one major disadvantage: Like other great technological advances, it is a completely new way of doing business. It is human na ture to resist (even benevoient) change. Those people who do not take the time to learn the new technology or at least understand its use, might continue to cling to older methods of interco tion. Like the gasoline engine's dominance over the horse and buggy, its future dominance is destiny.

Mohen Teleprocessing Corp. Garden City, N.Y.

Peering into optical storage myths

I am continually dismayed at the tenet that opti-cal storage is handicapped by write-once technol-ogy and that until a disk is developed on which us-

ogy and that until a disk is developed on which users can write multiple times, there can be no real development in optical storage. These are paralyzing notions. I want to explore these myths. Consider the money involved: IBM earned morth as 20 million issty ears reling magnetic DASD. This kind of data storage costs about 13 per megaby per month. What seense would it make for IBM to lower its earnings by selling a competing, lower priced data storage device? Like it or not, IBM con-trols the software and hardware choices of the

overwhelming majority of computer installation Examine history: Hollerith punch cards were in widespread use for decades. They were used by programmers to store code and control statements.

They filled file cabinets with accounts paid and re-They filled file cabinets with accounts pain and re-ceived. Cards were delicate. Cards were rendered useless by humidity, handling and repeated use, yet cards were a predominant medium of data ex-change for many, many years. IBM closed its last punch-card factory in 1884. Not 1948, 1984. It is my sense that optical disks have the poten-

tial to be the punch cards of the 1980s: Cheap, dis-posable, portable data storage. The costs? Just a few cents per megabyte per month. The speed? Modern optical systems are hundreds of times fast-er than punch cards. The durability? Optical disks have few environmental restrictions. Put them in a piastic case, and they are at least as durable as the thousands of reels of tape that are sent around the U.S. every day.

We handicap ourseives when we refuse to cor-sider optical storage in other than the narrow per spective of a tape or disk replacement. It is a dif-ferent sort of storage, and it demands thinking, not stereotyping. If America waits long enough, until stereotyping. If America waits iong enough, until multiple-write disk technicology and high-speed transfer become realities, the Japanese will once again offer the only competition for IBM. And the Japanese have nothing to lose and ev-erything to gain if they produce optical storage de-vices with a DASD personality. The climate is fast

coming right for a revolution that relegates our llions of dollars worth of 3380 disks to the tech-

Systems Support Representative Vion Core

VIEWPOINT

Overcoming management timidity in contract negotiations

READER'S PLATFORM

Blind acceptance of

vendor price and service offerings is

simply a residue of another era — a time

Nontraditional rules in deals with vendors

By DOUGLAS R. BYREE an you imagine a DP manager negotiating a maintenance contract outside the terms of a mainframe vendor's traditional and standard offerings on a \$250,000 equipment purchase? Given the same dollar value, can you now imagine the same company's automobile fleet manager, or physical plant manager or purchaser of typewriters not nego-

ow the answers to the questions. The average data process-ing manager would not think of nego-tiating. It just isn't done. It's not tra-

Blind acceptance of vendor price ad service offerings is simply a resiand service offerings is simply a rea-due of another era — a time of no real choices, a time when AT&T de-cided our telecommunications op-tions, and any purchase outside of a very few mainframe vendors was considered venturesome indeed. At last glance, the problem is now a pro-

ion of chaices. Let us propose some proactive answers to the buyers' bewilderment. What is negotiable? Everything. How do you negotiate? Just do it. Negotiating expertise is learned only by do-

ating expertise is tearned only by do-ing. The only rules are those born of each specific negotiation. The following are beginner's weapons to be stocked in one's nego-tiating arsenal. The first two are

Bybee is president of Bybee and ssociates, Inc., a data processing anagement consulting firm in ringfield. Ill.

mandatory when dealing with main-

mandatory when oealing with main-frame vendors:

• An intimate knowledge of your
vendor's organizational structure.

You must know its cost centers, reward (salary) structure and the level
(person) where various decisions are
made. You should know to reviet beyou to the property of the property of the protory of the property of the property of the protory of the property of the property of the protory of the property of the property of the protory of the property of the property of the protory of the property of the property of the prosecond of the property of the property of the prosecond of the property of the property of the prosecond of the property of the property of the prosecond of the property of the property of the property of the prosecond of the property of the property of the protory of the property of the prope

\$250,000 purchase, you can bet that dor has

centers for syss engineering sales. Its system n will charge

engineering diviback the marketing division for its special effort marketing orb the cost It is a lot more likely to if you can say, "Harry,

keting at the district office. If you keting at the district office. If you want our business enough to absorb the cost, we'll discuss the sale."

If you have problems finding out how your vendor is structured, contact a friendly OEM. OEMs are excelarces of information on new product offerings, price reductions, rending discontinuances and market

on rests with man

Third-party purchases. If you are of any size whatsoever make an occasional purchase of your vendor's fuct vis a third party. It makes no difference whether it's a third-party equipment lease or a personal com-puter from a retail outlet — just do it. After a few third-party purchases, you will be surprised how many spe-

cial deals (remarketed equipment, a buyer for the equipment you want to sell, mysterious purchase credits, tri-al use of software and so on) your

en will discover. propriete for negotiating with non-mainframe vendors:

• Denand that contract termina-

tion options are in your favor. You ate anytime within five days; the vendor terminates with 60 days notice and only at deliverable points. The vendor ter-

> penalty; you do Pay as little
> se possible as
> late as possible.
> Money is not
> only the best pertion, but its use is a valuable re-

source to your company. If the project has four of no real choices. start your negotiations as paying 10%-10%-10%-70%. If negotiations end at 20%-20%-20%-40%, you're still way d of the game

• Get as m uch as you can as early Get as much as you can as early as you can. In the same four-phased project showe everything you can into the first phase: Develop sub-phases for sign-offs. Negotiate the "when" of deliverables.

• Own everything prod distely: every memo, every test file,

every preliminary document, every rough draft. Try diligently not to have draft copy and testing material rship related to payments. e Have the stated option of removing any of the vendor's pers any time during the contract. Fear is or motivator for your own em

s, but it's fine for som ployees, but it's fine for someo elac's if necessary.

• Don't be afraid to wheel and de

especially if the endeavor is relative-ly new to your industry. Successful experience with a marketable new ndeavor can be a vendor's most aluable asset. The vendor will pay

• After you get a feel for the vi After you get a feel for the ven-dor's prices, prepare a standard ser-vice contract presenting all generic activities (cancellation clauses, pay-ment scheduling, personnel approv-als, maximum per-hour dollar limit are expecting and so on) to your adan, maximum per-hour dollar limit per expertine and so on) to your ad-vantage. Use the standard in your original conversations. The vendor comes in well prepared to say he charges \$100 per hour for his project leader; he just as well reconstruct. leader; be just as well prepare say, "Our company can pay not more than \$50 per hour; my hands are tied." Settle later at \$75 if you want. Remember in some instances the ownership and marketing of the new

system (in whole or in part) is a nego able item. Keep in mind that the aforemer

Keep in mind that the aforemen-toned are simply examples of negoti-ating weapons and need not be of val-ue in and of themselves. Original contract offerings should be viewed always as proposals. Before you be-gin discussions, take appropriate time away from vendor interference to analyze and weigh each contract term's value to you

Purchase without negotiation strikes many a chief executive officer as the most egregious of manage-ment improprieties. It is one of the many reasons most MIS directors and DP managers are stripped of any real purchasing authority. Data processing managers traditionally recomend while other managers act. stigma will not be shed until some of the traditional rules are shed.

Systems analyst: Diagnostician or technical virtuoso?

By FRANK C. FILLMORE JR.

Professor Efrem G. Mallach makes an interesting case for developing systems analysts with business rather than technical beckgrounds in "Systems analyst pasted: No programmers need apply" (CW, Peb. 17, Unfortunately, instead of calling for a balanced perspective on the part of an analyst, Mallach goes overboard in the other direction.

direction.

It is human nature for an educator to derive self-esteem from the courses and subject matter he teaches. In the last 10 years, however, coling programs and related disciplines, once the stock-in-trade of computer once the stock-in-trade of computer science and MIS departments in colle-giate schools of business, have be-come the moral equivalent of fresh-man English: a dirty job nobody

wants to do. But since those hide-bound DP professionals doing the hiring want entry-level people with a modicum of skills that can be of im-mediate use, the professors must keep churning out the Cobol 201

READER'S PLATFORM

nue oncy ave-nue open then is to tell MIS directors that they should hire analysts who have a business background, techni-cal skills be damned. If such a cal skills be damned. If such a notion were to take hold it would lead to a sexier curriculum and better class-room assignments benefiting primar-ily . . . well, you get the idea.

An illustrative story is one that as then Vice-President Lyndon has then Vice-President Lyndon Johnson marveling at the deep think-ers with whom President Kennedy had surrounded himself. His listener, House Speaker Sam Rayburn, thought for a moment and sailed thought for a moment and replied:
"Well, Lyndon, they may be as smart
as you say, but I'd feel a hell of a lot
better If one of 'em had ever run for

To carry the analogy one step fur-ther, if you were going into surgery

would you prefer a super diagnosti-cian with a good bedside manner (the medical equivalent of Mallach's model systems analyst) or would you rather have a technical virtuoso smil-

as the anesthesia Perhaps you self, Why can't l are saying to yourself, Why can't I have both? — a cross between famed heart surgeon Denton Cooley and Alert Schweitzer, as it were. That is

percisely the point.

My definition of a systems analyst
is considerably more succinct than
Mallach's: Someone who translates iness requirements into user's business requirements into technical systems specifications. Any translator must be proficient in both the original and target lan-guages with which he is dealing. Of course there have been horror

ries about technically correct aye ems that were unusable in the real world; on the other hand, I have seen sig Eight consultants with MBAs earning how to use a keyboard — on g how to use a keyboard — on time at \$200 an hour. An abstractly designed system that deals back end is worse than pointless. It could lead to the mirror image of the ntmares mentioned above: a user's dream that is impossible to iment or is at best economically im-

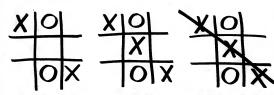
ances will beln mide Two circum the industry toward equi where systems analysts are con-cerned. First, a greater reliance on schaged software will have analysts evaluating alternatives more frequently than proposing new solu-tions. This is a good slot for entrylevel junior analysts - you see them all the time in information centers. Conversely, a greater degree of technical savvy on the part of users will limit an analyst's ability to in-timidate them with jargon and a youuldn't-understand attitude, all the

while requiring the analyst to be faithful to the user's business needs. Add to this the ancillary trends of prototyping, end-user computing and the like, and you have a future of fairly rosy prospects relative to the systems analysis discipline -- Cobol 201 notwithstanding.



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NYNEX
Business Information Systems (2)

COMMUNICATIONS



The audience makes the show

enneth Thurber would never have brought his IBM vs. AT&T Local Network Strategic Issues seminar to Boston if his family had not been set on visiting the city. Thurber, president of the Minneapo-

a nurber, president of the Minnespo-lis-based consulting company Architec-ture Technology Corp., has nothing against Boston per se; what he objects to is the fact that "in Boston, I always get too many vendors and too few users in the audience."

Thurber's point was a valid one, I discovered while sitting through his vendor-filled Boston seminar. Not that

discovered while sitting through his the best marginary representatives from ATAT Digital Engineering Live from ATAT Digital Engineering Live from ATAT Digital Engineering Copy. Northward Co

Horseitt is Computerworld's senior

AT&T to sell its T1 switch

Provides Dacs-compatible switch on user premises

By Stanley Gheen
Responding to the growing customer de-mand for on-premise T1 network control, ATAT information Systems recently closed plans to offer T1 multiplexers that are compatible with long to the transport of the Cross-Connect System Description. In addition, an ATAT Growing the said the company will offer customers on-premise Dara equip-

allan Halperin, AT&T information Systems product manager of 71 multiplexers, and that the company is actively pursuing a Dacs-compatible T1 multiplexer, in computing with Tellank, inc., and in shipping equipment to AT&T Communications to test for Dacs compatiblity. The Dacs-compatible T1 switch allowed the military test for Dacs compatible T2 bears of the Tables of T2 and T3 and T3 and T3 and T3 and T3 and T4 and T5 an

The original Dacs is a switching device residing in AT&T Communications' central Rolm users gain

AT&T access

by Elisabeth Horwitt
In a move that analysts called unsur-printing and inevitable, Bohm Corp. an-resis and inevitable, Bohm Corp. an-for compatibility of the Ti acceptance of the saced by Robn CES, prior, ATAT Communica-tions Digital Access and Cross-Communica-tions Digital Access and Cross-Communica-tions of the Communication of the Communications of the Communicat

offices that subdivides 1.644M bit/sec. Ti channels into 64K bit/sec. subchannels. Customer Controlled Reconfiguration, as ATAT tartif offering, enables users to route their transmissions out of Duce by entering commands at a remote terminal. Dice also can act as a customer inserface to ATAT transmission services such as Mega-

Does also can set as ecusioner interfaces to ATAT transmission services such as Seguinary ATAT transmission services are all Seguinary ATAT transmission services are all seguinary of the services and the services are all seguinary of the services and control in vital transmission of the services and control is vita remote terminals, and control is vital to the services of the services of

Ti channes.

"We believe there is a significant mar-ket [for Ti multiplexers] in the Dacs, Cus-See AT&T page 25

Sungard service lets users send backup data over Accunet

by Alam Algae
In conjunction with Inforces Systems
In conjunction with Inforces Systems
In conjunction to the Conference of Sungard Data Systems, Inc., recently associated Sungard Steward Accounts
From States (SASA), a regulated software for the Conference of Sasan States to the disaster recovery conter until acts to the disaster recovery content until acts to the disaster recovery content until a state of the Conference of ACRET Communication States (Sasan Sasan Sasan

Software creater common link for Pick systems/23 Concord Data Systems picks up MAP partners /23

w Western Union offers an enhanced Instant Mail Manager

INSTANT " "What-if" analy

sis arms the network manager with statistics to explain the costs and results of each proposed network change - so he can let his company de-

cole. This means that CBX users can now access AT&T digital services over a single TI link, Rolm and Such services include Accused TIA, Megacom and Negacom 800. CBX users can realise sub-AT&T services and Roles product manager Grahm and Roles product manager Grahm and Roles product manager Grahm control of the Roles product manager Grahm monthly savings of between 8% and 12% Sentill page 24% Se

Southwestern Bell chooses optical fiber for headquarters Eliminates need to alter

cable when system varies

By Elizabeth Heruttt
"We needed a distributed system
the process of the process of the control of the communications needs without requiring
a lot of cable; a system we could put
in once and never worry about
again," and David some Bell Corp.'s
Estateses Coutomer Bell Corp.'s
sion, explaining his company's choice
of optical fiber as the institute
Louis headquarters building at 1 Bell
Conter.

houses a wide variety of computers that serve as administrative systems for the local telephone companies in Southwestern Bell's five-state re-

gion. Southwestern Bell began shopping in January 1984 for a building cabing system that would link the 44-floor installation, which includes everalt BM mainframes; 25 mini-computers and microcomputers from Digital Equipment at General Corp. and NGR Corp.; and approximately 2,000 anyachronous terminals and

and NCR Corp.; and approximately 2,000 asynchronous terminals and 1,500 synchronous terminals. The company sventually chose a networking system based on optical fiber. Since there is still no cost-effective way to tap the medium, Southwestern Bell used point-to-

ter of workstations.
Asynchronous computers are connected to the fiber via an Exhernet controller rown Bridger transactiver from Codenoll Technology Corp. Billion and Wang computers are Illaed recely to the fiber through a suit-piezer from Phonoics International, Inc. The optical-fiber lines terminational, Inc. The optical-fiber lines terminational, and hole located inside wiring data. The behalf before are also considerations prompted to the control of the control o

Several considerations prompted Southwestern Bell's final decision to use optical fiber, Stein said. "We liked the fact that fiber is virtually personnels."

State also cited the fact that opti-cal fiber "can carry a signal further," — reportedly up to 60 or 50 miles — without the need for a repaiser. This continues the need for a repaiser that the continues of the continues of the continues need receives the continues of the continues the continues of the cited by Scinis was the medium's in-tenderability to decironagisetic in-terferent the continues of the continues of

Codenoll Executive Vice-President Ernest Raasch said that several of his omers have been companies that coaxial cable in old buildings, See SOUTHWESTERN care 20

Fourth Generation Software

Many there's and anterway volution for all year indemention Contar made. One admitted for all year op-

in the second se

Shall pook, an easy seport or providing political and pook. Comm. 12. beginned the desired line help facilities
to it sacy to handle
ry application, quickly
tocurately.

there, and present results with the SAS System. Plus you can file amployee and applicant records, analyze benefit coverage, and manage as a system. The SAS system is all applicant all applicant and policy policy.

Schedule for Well No. 121-00

This Mass N, 19 - Y, MED, NE Sin AcAPE DOUGH MASSING Color Mester of N, 15 CP ME. Sign Condition of N, 15 CP ME.





for Your Information Center,

FOUR EASY WAY'S TO KEEP UP WITH THE JONESES.



unprotected fields, making changes in data more visible.



et Up Mode/Spile Screen & Scredling: Provides simultaneous access to to sensions, and determines how much of each session will be seen.



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So you owe yourself a good look at ITT Courier's 9000 series terminals and our exclusive 3270 Set Up Mode. Together, they allow you to customize your screen formats so only the information that needs attention gets it.

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ITT COURIER TITT

MAP partners

By Rosemary Hamilton MARLBOROUGH, Mass. my nosemary reaminos
MARLBOROUGH, Mass. — Concord Data Systems, Inc. added two
more vendors — Siemens AG and
Data General Corp. — to its growing
list of partners in the marketing and
development of Manufacturing Automatter Dates. (MAR)

mation Protocol (MAP) products.

At the European MAP Users Group meeting held earber this month in Paris, Concord Data said Siemens, a maker of factory floor control de-vices, had signed on as an OEM of Concord Data's line of MAP products, including its Mapware communica-tions controller, Token/Net Interface Modules, 10M bit/sec. broadband mo-

dems and 5M bit/sec. carrierband mo-Under the terms of the multiyear agreement, Concord Data will also work with Siemens to develop other MAP interfaces for Siemens equip-

Prior to the users group meeting, DG announced that it had signed a joint marketing agreement with Conporate some of Concord Data's prod-

ucts into its line. Concord Data network interfaces will enable DG's Eclipse MV line of processors to communicate over IEEE 802.4 token-bus broadband networks, according to a spokesman for

Concord adds | Laguna Connection knits Pick systems users

problems inherent in tying Pick-based units

By Rosemary Hamilton LAGUNA BEACH, Calif. — Com-panies that have had trouble getting different vendors' microcomputers and minicomputers running Pick Sys tems' operating systems to communi

tens' operating systems to communicate have solved their problems with the Laguna Connection. The noftware package was reently released by Laguna Software & Consulting Co. "It did the Joh." aid Roger Glenfield, senior technical support specialist at CES Becords International, as division of CRS, inc. Glenstandosa, as division of CRS, inc. Glenstandosa as division of CRS, inc. Glenstandosa, as division of

sonal Computer ATs and two XTs, all running Pick. "It ran without modifi-cation, and it was certainly better than our prior Pick networking expe-riences," he said. Glenfield said CBS Records had tried one other communications package that was so bad he refused to name the product. "We were ex-

tremely dissatisfied. It gave consis-tently bad results." Since Pick Systems first introduced Pick in the early 1970s, a number of manufacturers have licensed it and added their own variations to it for their hardware. As a result, data

Solves communication transfer between different Pick-based systems has been difficult, if sible, until now.

James Wagner, a consultant with Computer System Advisors, said there is plenty of demand in the Pick world for a product like the Laguna Connection. Wagner is also a member of the International Data Base Manufacture of the International Dat facturers Association, whose mem-bers include Pick manfacturers, users and resellers. He pointed to an increase in the number of large, multi-vendor Pick installations that often include a mixture of personal com-

puters and larger systems eration 'ween't pi

The data processing department of the City of Irvine in California, for the City of Irvine in California, 107 instance, needed to perform data transfer between Pick-based micros and an Ultimate Model 6800 that was also running Pick. Prior to Installing the Laguna Connection, this operation "wasn't pleasant," said Linda

the Laguna Connection, this opera-tion "wasn" pleasant, "aud Linda Ristow, manager of information ser-rices. "Por the most part, we'd have to back up the files on tape, and then a programmer would try to work things through," she said. Ristow's office purchased the La-guna software package four months ago. "R's not lightening fast," she said, "but there hasn't been one er-or, and we've transferred several

ror, and we've transferred several megabytes so far. It really simplifies e process for us." Another satisfied Laguns Cor

tion user, Braver Lumber Co. in De-troit, previously used the U.S. Postal Service to transfer data among Pickbased Pertec Computer Corp. 2000s at 10 remote facilities. Sehre very happy with the Laguna Connec-tion," said Edward Heiss, director of information systems. "Of course, we might be easy to please because it was so awful before."

Prime Computer, Inc. and Ultimate, offer networking software for their Pick-based systems, there are no oth-er vendors that currently market a package that allows comm package that allows communications between a large number of different systems, according to Wagner of Computer System Advisors. Pick Systems is considering resell-

ing the software, although "we haven't decided yet," said Phil Earl, director of product management for the IBM PC version of Pick. Earl said Pick Systems offers a communica-tions package that "functionally does the same kind of things as Laguna, but isn't as user-friendly."

There is a possibility that the com-pany could phase out that product, called the Pickware PC Communications System, if it decides to carry the Laguna Connection, Earl said. the Laguna Connection, Earl said.
Laguna license fees are based on
the number and make of processors
that a user has it is available for 11
different processors. Prices range
from \$296 for small system processors to \$1,900 for high-end systems.

A Few Words About NET/MASTE

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MINICATIONS

Sungard service uses Accunet

"Because of line and cost con-straints, many companies previously opted just to back up production files," Bogle noted. "Using SNAP, they can back up their entire data centers."

they can back up their entire data
Accument Reserved 1.5 service
availables in appreciamately 30 cities
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ent, Sungard said. The remote test offering er The remote test offering enables customers to send test data to a back-up facility from remote locations or actually recover test data from a backup facility, the spokesman said. This reportedly eliminates the need for subscribers using a particular

backup center's hot site to have their personnel on hand at the center.

"In some cases, companies have to send 30 or 40 people to test the back-up process," Bogle said. "Now all they have to send is a tape hanger, run the test from a remote site and save the expense of having to send all

roan the test from a remote site and home people. See the seed of the seed of

\$3,000, "depending on line usage, 80-ps and multiplescen used in SNAP are supplied by Infotron, under a 12 mil-lion contract overring 1896, an Info-tron spokenman said. The contract will be extended as Sungard expands to geographic coverage, he ados to its proposed by the contract of the con-tract of of th

delphia and Chicago, the new backup center will offer a computer hot site, or fully equipped and staffed com-puter room, and a cold site, or ready-conditioned space, where a complete computer facility can be installed by a subscriber.

A Sungard spokesman declined to provide specifics on the firm's part-ners in the project.

Rolm users gain

AT&T access From page 19

over WATS, "and Accunet T1.5 saves over 2,400 bit/sec, private analog ouce-grade lines for distances of up to 700 or 750 miles," he explained should move at 100 miles, "he explained should move at 100 deving up, the price of private analog lines." Josquin Gonzales, program direc-tor of telecommunications services

Josquin Gonzake, program director of telecommunications services for the Gartner Group, Inc., a Stamford, Conn., communication services is a manufacture of the Gartner Group, said that compatibility with ATAT Communications services is a manufacture of the communication services in a manufacture of the communication services are also in the communication of the co

CBX users also will be able to use a TI link to interface with comparable services from long-distance carriers services from long-distance carriers such as MCI Communications Corp., U.S. Telecom, Inc. and Bell operating companies whose interfaces are AT&T-compatible, Chloupek said.
David Terrie, president of Boston-based Newport Consulting, said "It comes as no surprise" that Rolm, an

IBM subsidiary, has announced com-patibility of its products with IBM networking archrival AT&T. "IBM can't shut off some of the biggest net-work services out there just because

they are 'not us,' "Terrie said.
Chloupek desired Bolm walted ood nog to man some of the common of the Megacom service in November 1986 and is just beginning to provide it now," he said with ATAT'S Dacs switching system at the 1.64 Mit/sec. Terrie was the said before the common of the common of

patible with AT&T services for the past two years. "We developed the interfaces then to be sure that we would be ready when they were ready," he added.

to bearing on other T1 interface

Rolm spokeswoman Helen Miale said that the company's recent an-nouncement has no bearing on its strategy for conforming to other Tibased communications interfaces.

Rolm is one of the few PBX ven-

toom is one of the few PBX ven-dors that has not committed to either the Digital Multiplexed Interface (DMI) proposed by AT&T or the Com-puter-PBX Interface (CPI) jointly proposed by Digital Equipment Corp. and Northern Telecom as an industry standard for Tl-based computer-to PBX links

oim feels that DMI con than CPI to the evolving Integrated Systems Digital Network standard, but not close enough," Miale said. "We'll come up with our own ISDN-"We'll come up with our own isDN-compatible T1 interface as the stan-dard evolves. We're already working on it and keeping up with the latest ISDN updates," she added.

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AT&T to sell its T1 switch

tomer Controlled Reconfiguration arms. Halperts said. Ambient said. Ambi

"Finally, ATA" is going to let you do at your premises what they have considered to the control of the control tion systems, one for yours, one for

AT&T's."
Several T1 equipment vendors have taken advantage of AT&T's deiny in offering Dacs-compatible T1 multiplexers. "Several companies are now actively pursuing this window

of opportunity due to AT&T pa ity in this market," said Kes Leon, a telecommunications an with L. P. Rothschild, Unter Tombia.

Natural Programments, University Programments of Badward Dity, Claff., has been compatible militagers after design and the second programment of Language Programments of Language Programments and the second programments and the second they will have evaluable Data Congramments and the second they will have evaluable Data Congramments and those companies and the second programments are second programments and the second programments are second programments. The second programments are second programments and the second programments are second programments and the second programments are second programments.

our men of citer sequences data was timed Back.

But Halperin underlined ATAT In-terminations determination to work together. We want again to appear as fully interprated and integratable control of the citer of the citer of the ATAT Communications will increas-to address the needs of large custom-rers, offering deep with the con-trol of the citer of the citer of the property of the citer of the citer of the theory of the citer of the citer of the theory of the citer of the citer of the theory of the citer of the citer of the theory of the citer of the citer of the theory of the citer of the citer of the theory of the citer of the citer of the theory of the citer of the citer of the theory of the citer of the citer of the theory of the citer of the citer of the theory of the citer of the citer of the theory of the citer of the citer of the theory of the citer of the citer of the citer of the theory of the citer of the citer of the citer of the theory of the citer of the citer of the citer of the theory of the citer of the citer of the citer of the theory of the citer of the citer of the citer of the theory of the citer of the citer of the citer of the citer of the theory of the citer of the citer of the citer of the citer of the theory of the citer of the citer of the citer of the citer of the theory of the citer of th ased services as needed, he said.

based services as needed, he said.

"AT&T is trying to send a clearly defined message: We're the only guy who can be a complete system vendor." We're headed back to being one AT&T "Halmerie said. AT&T." Halperin said

Okidata launches modems

Supports full-duplex data transmissions

By Elizabeth Herwitt MOUNT LAUREL, N.J. — Okidata MOUNT LAUREL, N.J. — Okidata Corp., a division of Oki America Co., launched its first data communica-tions effort earlier this month with the introduction of three moderns that support synchronous full-du-plex transmissions at rates of up to 9.6K bit/sec. over four-wire dedicat-

ed leased lines. The CLX96 series consists of the CLX96 point-to-point communica-tions modern, which sells for \$1,446; the CLX96FP multidrop modern, which costs \$1,996; and the CLX96M

which costs \$1,995; and the CLX96M multiport modern supporting up to four terminals and costing \$2,195. The multitory CLX96FF modern's "fast polling" capabilities enable it to respond to a bost's request for response within 15 mec. a competitive response time, according to Edward Pickens, Okidata's telecommunications product manager. In a multidrop configuration, a central host computer, equipped with

In a muitidrop configuration, a central host computer, equipped with a modern, polls a group of geographically dispersed terminals to determine whether they have anything to transmit. Each terminal is equipped with a muitidrop modern that must be able to respond quickly to the host's secured by present.

said. The CLXSOFP also can shapt to varying a little can be compared to the co

ers into the telecommunications market during the Comdex/Fall '85 conference, Pickens said. 'We have some well-established distribution channels that are ideally suited for other products besides printers; some of our dealers are already selling medium?

ing modems."

Pickens explained that the CLX96
line became Okidata's first entry into the telecommunications arena "be-cause the products were ready soon-er than we expected and because we think there is demand for 9.6K bit/ sec. modems in both the dedicated an

dial-up areas."

The CLX96 line will be available

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LINICATIONS

Audience makes the show

The few users in the sudiance seemed quieter than they usually are at these semistre. For Perhaps they provide the providence of the semistre of the semistre

different kind of conference: the Comiten Users Exchange (CUE). Du-ing the week of April 14, network managers met in New Orleans with NCR Comnen, Inc. representatives to discuss how the communications nt vendor can better meet its

equipment veneral supers inseeds. According to CUE President Edward McMeullen, whose corporate affiliation, incidentally, is not NCR Comten but ATAT Bell Laboratories, and the week is devota large portion of the week is devot-ed to meetings of working commit-tees to discuss specific products and

issues.

But while NCR Comten products were the common theme of the conference, the meeting had clearly bee organized and staged by users, who allocated plenty of time for discussion of networking issues and problems that go beyond any one produc

or vendor and to meet with their poers, exchange foles and "learn poers, exchange foles and "learn problem that I'm paint arrains to problem that I'm paint starting to think about," as one attendee put it. Wednesday was devoted to see-sions "that get beyond the obligate result to broader inselse." In addition, warding, the audience, even more so. During the question-and-ensure periode, attendees enthusiantically projected the speakers — and each choice of the companies net working problem the companies net working problem the speakers.

Typical was the first se

en by Patrick Krause, staff direct of telecommunications at McDona Corp. Krause explained how his com pany plans to solve its telecommuni-cations needs by becoming a test site for AT&T regional holding company Ameritech's Integrated Services Digi-tal Network (ISDN) offerings.

The question-and-enswer period covered a wide range of topics. A Martin Marietta Data Systems representative asked whether McDonald's sentative asked whether McDonaid a would be able to use its present wir-ing system to support ISDN services. An NCR Comten employee asked about McDonaid's expectations for its network management system, once it stopped being Ameritach's pilot site and started using ISDN on

an ongoing basis.

Thurber's presentation was at least as informative and timely as those of the CUE speakers; the dif-

ference between the two conference lay in the audiences.

Thurber's vendors were too wor ried about giving anything away to their competitors to allow a free ex-change of ideas. As a result, the seminar remained on a theoretical plane in which the relative merits of standards and operating systems were freely discussed, but a specific

int of view was lacking. At the CUE sensions, the flow of information went in all directions, not just from the speaker to the audi ence, which made it far more rewarding to the speakers, the audience and to any stray journalists who happened to be attending.

Southwestern Bell

Disk storage, with an average industry growth rate of 40 poccurs a year, is the fastest growing component of most libit mainframe installations. And, perceived costs to manage disk storage are rising rapidly as well. The MC Antoniaed Storage Management software curbs expensive DASD parth and allows you to gain control of this valuable user. The benefits of ASMC software are reality apparent. A 25 persent in

in available DASD space is commonplace for a new ASM2 user. More importantly, ASM2 software enables users to add DASD without adding

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ng, restoring, backing up and magniting data ... automatically, it

s comprehensive set of DASD management tools that let you end

and determine your own. is storage management standards, and determine your own red report formats. All with sample user inserfaces.

contential report former. All with single our interfaces.

ASACL software further improves that center efficiency through its data reasonation facility. (DEI (confligent Throughoust Sentore). With DEI, you'll never again have to per-check data set availability, or innot manned material. What is more, the target look wheat dishipy allows for more data to be archived and sentered than ever below.

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"Resed on International Data Corp. study.

The Cambridge Systems Croup

gets optical fiber From page 19

only to discover that "error rates were getting out of hand," due to electromagnetic interference generated by copying machines or even el-evator machinery. "A lot of compa-nies install cable in elevator shafts,"

Reasch explained.
But Southwestern Bell's most important reason for choosing fiber, Stein said, was an internal requirement that "we wouldn't have to change the cable every time we made changes to our comp

Stein added that the architecture of the new headquarters put the company under a lot of restraints in terms of how and where cable could be installed.

be installed.

For example, the company had to use the duct system under the floor for the cable. "We couldn't use the ceiling." Stein explained. "Fiber's high bandwidth meant we would never have to add more cable," he

Optical fiber can carry multiple channels with an aggregate band-width of 200M bit/sec. or more.

"But our biggest reason for choos-ing fiber," Stein said, "is the fact that it frees us from the need to change the cable every time we change or move a box. We have Wang comput-ers that ordinarily would require twinxs, IBM computers that require 3270 coax and other systems that require plain old telephone wire. We can use optical fiber for all of these systems; all we have to do is use a different type of converter at the end of the cable

The regional holding company never seriously considered installing a network based on twisted-pair tele-phone wire and private branch exchanges, according to Stein.

ASM2 storage management software. Your bridge to the future.



SOFTWARE & SERVICES

Macro facility extends Cobol

ncreased productivity for applications developers occurs whenever a program trustens in delivered for for the program trustens in delivered for for code. This "more-for-hest" concept is the chriving force behind all of the pro-More for less is exactly what a macro facility provide for these developers, within a source program statement that expands into multiple estatements during each facility is not serv to seasoned assembler language programmers nor to mbler language programmers nor to ema software vendors that have used macros to increase productivity and standardization for many years. However, it is a very new concept to the majority of IBM IMS/Coboi pro-

in a classic letter to vendors of pro-activity tools, Glover T. Perguson escribed the benefits of a macro preprocessor as a way of bringing extensi-bility (additional syntax) to Cobol while maintaining continuity with the original syntax. In his March 26, 1984, original syntax. In his March 26, 1984, Computerworld in Depth article titled "A letter from users to vendors of ap-plication generators," Perguson stated, "This preprocessor allows a develop-ment group to extend the Cobol lan-guage with powerful statements that age with powerful statements cast il maintain the style and data defini-ess of the original syntax." A macro facility is not only a way of See MACRO page 30

Pfrenzinger is president of IMS Con sulting, Inc., an Eucino, Calif.-based consulting firm that specializes in IBM's IMS DB/DC and CICS/DL/1.

Adabas upgrade hits Europe

Enhanced system ends halts in data base access

By Welfgang Merkert

Computersoid News Series

ARRISTADT, West Germany — West
German software vendor Software AG has
announced in Europe an enhanced version of
its Adabas relational data base management system (DSMS). The new version, not
scheduled to be announced in the U.S. until
May 10, offers useen the ability to keep
their data base in operation even if one
user encounters a block of unreadable
unreadable.

data.

A block of unreadable data would otherwise half data base access for all users until the data base could recover the unreadable data from a backup source, and John McGuire, the chairman of Software AG of North America, Inc., the firm's U.S. subsidiary. While most DBMS software includes utilities to permit such recoveries, all halt data base access from one to 10 tes while the recovery takes place, he

Any interruption in data base access is

a hardship for some customers, such as large banks, that most continually update large banks, that most continually update "light now, 26% of all data has been customers have that requirement," he said, the continual continual continual continual continual con-trol and the continual continual continual con-trol continual continual continual continual con-trol continual continual continual continual con-trol continual continual continual continual con-trol continual continual continual con-trol continual continual continual con-trol continual continual continual continual con-trol continual continual continual continual con-trol continual continual continual continual continual con-trol continual continual continual continual continual continual con-trol continual c

pinced from \$10,950 to \$00,500, depending on the operating system.

The enhanced version is said to be fully compatible with the earlier version.

While a Software AG spokesman at the firm's world beadquarters said the new release is available worldwide, McGuire said it will not become available in the U.S. unit after a May 10 presentation in San Die-

go, Calif.

In other news, Software AG reportedly
plans to begin its own direct marketing
program in the Netherlands in the wake of
the decision by that nation's largest software distributor to drop Adabas.

a Cincom Sys-

tems ports Mantis to IBM's IMS/DC

NEW THIS

 Lattice, Inc. offers an RPG-II Complier

INSTANT ANALYSIS

calls has been phenomenal. I'm getting reac quainted with

what's out



DEC personnel system debuts

By Eddy Goldberg
BOSTON — An early user of Digital
Equipment Corp.'s All-In-One System for
Employment Management describes it as
"a real time saver" for moving resume
other job-related information around a

company. In terms of handling the flood of job ap-plications received each day by the user, United Technologies Corp. of Hartford, Conn., Nancy Gratacos, project analyst for corporate data processing, said: "In two hours we can generate about 300 resume responses."

duced last week at the Human Re-

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Automatic new-mail notification
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IBM software allows System/88 to function under SNA

Permits system to work as processor, controller

By Resonancy Hemilton

NYE BROOK, N.Y.— IBM is offering five programs that allow its System/88, a fault-tolerant computer, Inc.
system, to function in different capacities with Systems Network Architecture (SNA).

With the software, users can set
up a System/88 as a host processor communications processor or cluster

System/88 to accept transactions from a bank's network of SNA terminal of the bank's and the state of the system o

with applications running on the 57stern/88.

Primary SNA will be priced at \$4,500. Both it and the related products are expected to be released in early 1987, according to IBM spokes-

The System/88 Secondary SNA al-lows the system to connect to SNA networks as a cluster controller. It will self for 85,500.
Secondary SNA provides an appli-cation programming interface for various logical units, allowing them to communicate with CiGS, IMS and System/88 Primary SNA applica-

ons.
Operating together, Primary SNA
d Secondary SNA allow user appli-titions to be written to interface be-reen upstream SNA host applica-ing and downstream SNA

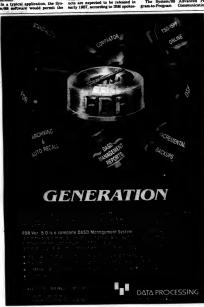
plications.
The System/88 Advanced Proam-to-Program Communications

software allows System/88 applica-tions to communicate with each other over the Synchronous Data' Link Communication link through the SNA LU6.2 interface, according to

IBM spokesmen.
The Advanced Program-to-Program Communications is priced a \$8,000. mications is priced at

The System/88 Com and Systems Management, which will sell for \$5,000, links the system to sett for \$5,000, make the system to the SNA network management facili-ty and allows it to participate in the management of the network.

ty and anows to participate management of the network. The System/88 Network Interface Support, which will cost \$3,000, pro-vides the SNA communications ser-vices for these new programs.



DEC personnel system debuts

From page 27

ources Systems Professionals show

science Systems Professionals about no Boston, the pacing is built around a new version of Deciphenatch, a program introduced but year on a simulation of the professional confessional con

to Janice Kengef, DBC products marlessing manager for Human R.

At United Technologies bendquaring the Committee of the C

obs. n will be available in See DEC page 31

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Macro facility extends Cobol

rom page 27

extending the Cobol language but also a way to simplify BMS DB/DC and Cobol. It will also explain why having a macro facility is becoming an important selection criterion when evaluating BMS/Cobol productivity tools. While BM's DB2 is getting a lot of attention currently, productivity issues for Cobol and BMS result ill supportant.

are still important.

A macro facility has four basic components: the macro, the macro processor, the macro library and the macro language. The macro is a command embedded within a source pro-

mand embedded within a source pro gram statement.

A macro processor scans the source program that contains these



source program that has been expanded at the point of each macro. The macros are expanded based on the definitions on a macro library that is also input to the macro pro-

the definitions on a macro morry, that is also input to the macro processor (See Figure 1). The definitions on the macro li-The definitions on the macro literal processor. It is truly a language that directs the actions of the macro processor. It is truly a language in itself and supports conditional logic, branching, arithmetic and string manipulation of I/Os. IMS DB/I/C interfaces are notori-

IMS DB/DC interfaces are notoriously complex and require long learning curves. A macro facility can be used to simplify these interfaces. An example of this simplification

be used to simplify these interface An example of this simplificatio can be found in Sage Systems, Inc. APS/IMS, which uses a macro fact ty to senerate native IMS data bus



and data communications interfaces.
The examples in Figures 2 and 3
illustrate APS's data base macros.
In the source statement example
shown in Figure 2, DB-OBTAIN is the

In the source statement example shown in Figure 2, Dh-OFFAIN is the name of a macro, and the other works that follow it are parameters. The macro and its parameters are incoming the control of the cont

In the example shown in Figure 3, the DB-OBTAIN macro expands into a fully qualified path call to IMS segments CUST-SEG and ORD-SEG. It mine a match on the ORD-SEG. scample illustrates how simple tively complex DL/1 call can be

ing a macro facility. —
A macro facility can bring major productivity improvements to IMS DB/DC conversions. Easy Wright, in-formation system manager at Lowest deorgia for a manager at Lowest deorgia for facility was used—with great success to simplify IMS DB/DC interfaces and to standardize application routines during a conversion from Bperry Corp. to IBM hard-

JUSYAL intertaces and to mandarous application routines during a conversion from Sperry Corp. to IBM hardware and software."
Cobol effekt in the In Depth section (CW, Sept. 10, 1984), supported the use of macro facilities. Conner stated, "Macron make assembly language comments with Cobol has no such

A macro facility has the effect of extending Cobol by essentially adding a new high-level syntax that yields increased productivity. This



extensibility and open endedness will add longevity to Cobol's dominance as the most widely used procedural language. It is true that the nonprocedural features of some productivity tools have reduced the need for a procedural language when specifying data validation logic (such as numeric ranges, edit masks, table lookups and

validation logic (such as numeric ranges, edit masks, table lookups and so on).

But unless your new applications are all data entry in nature, a procedural language like Cobol, with its IP-THEN-ELSE, PROCESS and DO-

WHILE constructs, will always be required.
Macro facilities are able to address productivity and standardization problems in Cobol development by allowing commonly used Cobol code to be defined once and then

tion problems in Cobol development by allowing commonly used Cobol code to be defined once and then invoked as many times as necessary. It is becoming common practice to build extensive groups of these macro definitions to aid development. These are sometimes referred to as

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SOFTWARE & SERVICES

In the example shown in Figure 4, principal balance change macro PRIN-CHANGE) that uses the cur-PHIN-CHANGE) that uses the cur-nt principal balance and the sount of the principal change will adify a borrower's amount owed. its will expand into a CALL state-uat to a common module (subrou-se) using the appropriate passed

White apparently not an impres-sive productivity gain in itself, the fact that the macro expansion inmay prouncurity gain in itself, the fact that the macro expansion in-cludes required copybook definitions and additional code to ensure a prop-er audit trail interface (such as user-id, time, term-id) means both produc-tivity and standardization will be greatly improved. An interesting feature of a macro



Many developers often find it hard to distinguish between the cor-cept of a macro and that of a subro-tine. The difference is, in fact, clear

acro is actually replaced by its

If a fixed sequence of statements cocurs frequently in a program, then hose statements can be written as a unbreatine, and each occurrence in the program is replaced by a state-ment to jump to this subroutine, exc-te it and then return (for example, PEEFPORM or CALL in Cobol).

There is then only one copy of the guence of statements. If macros

utired ithrouge section and procedure divi-sion code.

This ability of a single macro to affect code in multiple program loca-tions gives the macro substantially more power and flexibility than the

A macro facility, with its more-feless concepts, provides major productivity and standardization improvements for IMS/Cobol development and maintenance.

Users rate MSA applications at group meeting

LAS VEDAS — Attendees of Management. Science America, Re's in America, Re's in Las Vagas offered the following close variation with the Science America, Re's in Case Vagas offered the following close variation with the Case of the Cas

DEC personnel system debuts

From page 28

me, with prices for all three compo-ents ranging from \$32,400 for the icrovax II to \$174,000 for the VAX

The Employment Management system can be listed with Pigtat's betting and the Allo-One Spieme for Business Operations, as well as with The Investigate the Allo-One Spieme for Business Operations, as well as with The Investigate (Investigate Control of the Investigate Control of the Investiga applicant may be qualified, DEC

out of your system is our 6240 HDP Disk Storage Subsystem. It delivers double-capacity storage in a single-capacity foot-print, just like IBM's double-capacity 3380. But, unlike the 3380, the 6240 has single capacity speed. Each of these products is designed to protect your invest-

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Breaking Away.

Novell broke out of the local area networking (LAN) pack nearly four years ago with the introduction of the file server. We called it a LAN milestone Others scoffed. Three years later, when IBM announced that its LAN systems would be file server based, the rest of the pack finally headed for that first milestone.

Bus Korell was already milestones ahead. By porting the NetWarc⁶ LAN Operating System to 30 major LAN hardware configurations and offering over 3000 NetWare-compatible multiuser applications, Novell had established a de facto LAN standard. A standard now utilized by more than 200000 NetWare users worldwide.

With the introduction of System Fault Tolerant (SFT) NetWare, Novell passed another LAN milestone: affordable fault tolerance for nearly all LAN systems. And the rest of the pack is only beginning to talk about reaching that milestone down the road.

Moving Ahead.

Today, Novell isn't resting. On pass achievements or anything else. While other companies are struggling to reach Novell's LaN milestones, Novell is forging an even bigger lead in LaN technology, systems and service. I celad so big that many major LaN compettors are now buying Novell rechnology just to stay in the race.

Being a leader is hard work. But Novell is in front to stay. Because nothing compares to the view from the front. Especially when you look forward to the milestones ahead.

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MICROCOMPUTERS



Hardware pick: Intel board

his column is the first in what will be a regular monthly event here in Computerword, featuring a personal computer hardware product that offers significant value

and utility to be My April pick is Intel Corp.'s Above ourd PS, a multifunction expansion hoard for the IBM Personal Computer and compatibles. It provides a system clock, serial port and arallel port along with up to 1.5M bytes of memory

For most business users, the real limitations of the IBM Personal Com-puter (as opposed to the Personal Co-puter XT and Personal Computer AT models) tend to be the lack of a Win-chester disk drive and limited expan-sion slots. The intel 8068 chip generally

res adequate speed. The Above Board PS offers regular

The Above Board F5 offers regular and extended menory conforming to the Lottus fined // Microsoft Extended Memory Specification (EMS) along with a system clock, printer post of the Lottus fined // Microsoft Extended Memory Specification (EMS) along with a system concept of an exceeding the PC see Expansion slot limitation. The Above Board F5 can bring the system memory on a IBM PC, PC XT occupatible up to the maximum 640% bytes (644% bytes for the older Model Averation of the IBM vector for the older Model Averation of the IBM vector for the older Model Averation of the IBM vector for the older Model Averation (DS). Additional memory on the Ms-DOS. Additional memory on the Above Board PS can be accessed directly as Board PS can be accessed directly as EMS memory or configured as a ran-dom-access memory (RAM) disk. As extended memory, the Above Board PS' memory can be accessed by applications programs designed to take advantage of the EMS standard. These

advantage of the EMS standard. I nese programs include Lotus Development Corp.'s Symphony and 1-2-3 Release 2, Ashton-Tate's Framework II, Micro-soft's Word and Windows, and See HARDWARE page 38

Zachmann is corporate vice-pr dent for research at International Data Corp. in Framingham, Mass.

Lab targets user frustrations

Stresses brief Help screens and well-written manuals

By Mitch Betts WASHINGTON, D.C. — Peering tho a big one-way mirror in their research lab-oratory, psychologists Carol Mills and Da-vid Schell have watched scores of frustrat-

"user-friendly" software packages.
They have seen error
messages that flash on the messages that fram or con-screen so briefly the user cannot read them. They have seen Help windows that obliterate the portion of the screen for which the

of the screen for which the user needs help. And they have heard lots of complaints about man These are the types of problems that re-searchers discovered at the Usability Test Laboratory of the American Institutes for Research (AIR), where developmental software is previewed by users before it is released [CW, Nov. 11]. AIR psychologists

e video cameras, microphones, on irrors and other techniques to m The lab's confidential clie

prerelease software to this kind of scruti-ny in the hope that ease-of-use features will give their products a competitive edge, according to Carol Mills, director of

now realize that usability is critical for capturing the buyers who want to

spend, at most, an hour learning how to use a soft-ware package.

Not only are software

e lab.

"We like to get the product in for testing
early as possible because we can be
ore helpful to the product early in its declopment," Mills said in a recent inter-

Software firms once considered this kind of testing too expensive and time-con-suming, but Mills said they

Software firms now realize that

prarring
Not only are software
Time becoming interested
in usability testing, but
have shown time becoming interested
in usability testing, but
have about the same large oppositions
take to test software products that are developed in-house, Mills and Schell said.
The AIR lab, started in November 1864,
has discovered that connected vendors
sometimes ignore such seemingly obvious
steps as results on the seemingly obvious
testing and the same of the same steps are results or the same steps are results or the same steps are results or the same steps are seen or corner prompts and giving

mecumes ignore such seemingly obvious eps as removing computer jargon from annuals and on-acreen prompts and giving sers enough time to read screen messages. In the interview, Mills and Schell dis-

ware companies willing to subject their

INSTANT

ANALYSIS "You get what you pay for. When you put in the communications

of compatibility."

— David Herman

den you lose a lot

ITT rolls out high-end business micros, aims at multiuser, networking applications

⁸⁹ Alam Abore

15/W YORK — Struggling to lift itself into contention in the intensety competitive business computer marketplace, ITT Corp. is Information. Systems Division in the content of the co

ured to handle up to 16 users.

Mark Fowler, ISD senior vice-president
of product management and development, of the Xtra XL will often be sold as a re placement machine and will be pos

gainst existing multiuser systems on rice/performance. "The Xra XL offers wice the performance of the IBM Personal imputer AT," he claimed, "and two or hree times the performance of AT&T's B2 at eignificantly less cost." According to a recent study by inherna-

According to a recent study by Interna-tional Data Gorp., a Framingham, Mass-based market research firm, ITT had a vordwide installed hase of approximately 100,000 units as of the end of 1986, rance (are the company) of the company of the Corp. and other suppliers. The company, however, only selected the market in 1964. The Xira XL is based on an 8-M2 state stre- waite for the company of the company of the selection of the company of the company of the caching and hard disk drives with an aver-

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A state of the sta

Datacopy rolls out a low-cost desktop optical character recognition scanner/36

Wang stashes its microcomputer prices/36

> NEW THIS WEEK

 Banyan upgrades its Vine virtual networking software NEC offers an

IBM AT-compat Ible Advanced Personal Computer IV

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card, all of a sud-

Datacopy presents text, image scanner for IBM PC family

Intended to make OCR cost-effective for office applications

By Buriel Bright
MOURTAIN VIEW, Calif. — DataMOURTAIN VIEW, Calif. — DataMOURTAIN VIEW Calif. — DataMOURTAIN VIEW Calif. — DataMOURTAIN VIEW Calif. — DataMOURTAIN CALIFRON CALIF. — DATAMOURTAIN CALIFRON CALIFRO

In addition, Datacopy dropped the rice of its Series 700 Word Image roccessing System (WIPS) scanners and announced five software pro-rams that work with both Jetreader of Series 700. The Jetreader convers

The Jetreader converts typewith n text into ASCII code and provides choice of 300 by 300 dot/in. or 200 r 200 dot/in. resolution for images. 100 dot/in. resolution for image Then connected to an IBM Perso ter XT, the system scans an

compater AT, the about one insute; with an IBM Personal Com-ster AT, the process takes about 35 comds. The scanner accepts a stack are to the state of legal size of of up to 10 sheets of legal size or aller paper. The system scans in either text or

image mode. Text that has been converted to ASCII code can be enter, while most typeset text, which must be scanned as an image, cannot. Unlike the Series 700 models, a sheet must be run through the Jetreader twice to integrate both text and

graphics.

Because the scanner is software-based, it can be trained to recognize an unlimited number of type styles, President Rolando Esteverena said.

ing data

Costs drop in OCR me

Previously, Datacopy's scanning systems ranged in price from \$3,950 to \$20,000. As costs drop, "OCR is in

the process of going from a special-ized tool to a general-purpose produc-tivity tool in the office," Esteverens

claimed.

While the OCR market is still a small niche, it should see some growth toward year-end, noted Michael Goulde, an analyst at The Yanchaet toutiee, an arranyst at the lat-kee Group in Boston.

Falling prices and the availability of better laser printers should in-crease OCR demand, especially in desktop publishing applications, he predicted.

According to Datacopy estimates, sales of imaging equipment for office automation markets should grow from \$71 million in 1985 to \$368 million this year. In these markets, OCR sales are expected to climb from \$34 million to \$60 million.

The new software includes th OCR Plus training program for \$995, an updated version of the WIPS software for \$695 and the \$245 WIPS

Editor for manipulating images.

Datacopy's Model 730 scanner has been reduced in price from \$4,950 to \$3,950. Model 700, which also costs \$3,950, now comes with \$1,240 of

Wang cuts prices across micro line twice in a month

By Eric Bender LOWELL, Mass. — Wang Labora-tories, Inc. has reacted to changes in IBM's pricing by dropping costs across its microcomputer product line twice since early March, cutting

line twice since early March, cutting system prices by up to 36% and option prices by up to 58%. The first round of price cuts, effective in mid-March, were designed to maintain Wang's strategy of pricing equivalent hardware at or slightly below IBM pricing, according to a Wang spokeswoman. The greater-than-expected pricing cuts IBM revealed April 2 prompted a second

round of price moves.

Reflecting the IBM moves, the Reflecting the 1BM moves, the greatest cut in system cost was for Wang's equivalent of the 1BM Person-al Computer XT. The price of a stan-dard Wang Professional Computer with five expansion slots and a 10M-byte hard disk drive fell from \$3,840

to \$2,440.
Among other changes, the cost of a Professional Computer model with dual floppy disk drives and five expansion slots dropped from \$2,870 to \$2,000. Pricing for an Intel Corp. 80,256-based Advanced Professional Computer with 20th bytes of hard disk storage and eight expansion of the computer with 20th bytes of hard disk storage and eight expansion.

The cost of a 512K-byte me option for the Advanced Profession Computer dropped from \$580 to \$295, while pricing on a 1.2M-byte diskette drive was slashed from \$650

Additionally, Wang cut costs on some communications equipment with the price of the Local Connect option that links micros to Wang Office Information Systems or VS sys-tems changing from \$1,400 to \$850.



From page 35

e access time of 28 msec. In its multiuser configuration, an 8MHz 80186 communica-tions processor is offered. An math coprocessor is

ITT said it is the first con pany to eliminate the 32M-byte partition requirement for storing MS-DOS files on hard disks in 80286-based

systems.

Asked how this was accomplished, Fowler declined to provide specifics beyond saying the firm worked very closely with Microsoft.
"We'd prefer others figure it
out for themselves," he said.
Model I, featuring 640K bytes of internal memory, a 1.2M-byte floppy drive and 40M-byte hard disk drive,

77

ITT said it is the first company to eliminate the 32M-byte partition requirement for storing MS-DOS files on hard disks in 80286-based systems.

lists for \$5,299. Model II, priced at \$7,299, is essentially the same except it features a 70M-byte hard disk drive. model III. listing for \$10,299, is equipped with 1.6M bytes of internal memory, a 1.2M-byte floppy disk drive, 40M-byte hard disk drive, a 60M-byte 4-in. streaming tape drive, an 8port coprocessor card and Xenix System V. Priced at \$12,299, Model

IV is es IV is essentially the same ma-chine but features a 70Mhyte hard drive.

Up to four coprocessing boards can be used on the two high-end models, provid-ing 32 intelligent I/O ports, the firm said, internal memo-

of from said. Internal memo-rof both models is expand-ole to 16M bytes. Included with all of the sodels is a battery-backed sal-time clock, an audio aker, two serial ports and one parallel port on the motherboard, six IBM PC ATn slots compatible expansion slots and three IBM PC XT-com

and three IBM PC AT-com-patible expansion slots.

All Xtra XL versions are currently available through ISD's national network of value-added resellers.

Approximately 400 busi-ness software packages will run on the Xenix-compatible versions of Xtrs XL, ITT said. "That's more software than is available for Unix systems," concluded Andrew Pages 1810 possible." rga, ISD president.

frustrations

software packages that should command the atten-tion of vendors and buyers

For example, they asserted that some so-called Help screens are less than helpful. "A good Help screen should be short, well under

three pages, and to the point. by step through the expected error pattern, provide easy access to specific pages and provide a quick exit," Schell said.

With menu-driven ware, it is important that the options be presented in un-ambiguous terms to avoid confusing the user, the reirchers noted.

tem should use the minimum number of keystrokes — hit-ting the return key often is unnecessary, according to us shou

he pruned of irrelevant op

Software mai rais should provide separate sections for novices and experts and pro-vide a good table of contents and index, the psychologists They stressed that mar providing step-by-step

providing step-by-step intractions on how to accomplish various tasks are much more useful than text that simply describes the product. "Users complain a lot about manuals that read the dictionaries, with the commands listed in alphabetical order, rather than [reading like] user manuals," Mills said.

"You don't necessaril learn in alphabetical order, Mills added.



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"(The PC Turbocharger is) one accel-erator board that has overcome the com-patibility problem . . "—CAD Report "With a PC Turbocharger, . . . unlike an AT, my machine can use almost every PC program on the market

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for high-resolution IBM PC graphics

ATLANTA — Tecmar, Inc. will in-iduce the \$395 EGA Mester con-bler card, designed to provide gh-resolution graphics for IBM Per-

the new controller incorporates il the features of IBM's fully ex-anded 256K-byte Enhanced Graph-3 Adapter (EGA), according to Mi-sael Kolberg. Tecmar graphics reduced

ng and the production grammable characters

maid. With the IBM Color Display, the board provides 320 by 200 eart resolution. On the IBM Monochrome Display, resolutions are 720 by 350 for text and 640 by 350 for graphics. An optional on-board serial port can be edded to EGA Master, silowing a money, prienter or other serial device to be statched.

Tecmar to offer EGA controller card | Data compression tool debuts

SAN JOSE, Calif. — The developer of random-access memory (RAM)-resident utility program Note-It is nuncing another accessory pro-

users, SQZ, which compr much as 80% for faster ses data as ansmission

much as 80% for faster transmission and efficient storage. Turner Hall Publishing, an university within Symanic Corp., is scheduled to ship the 170-80 Turner Hall general manager. The program works with all versions of 1-2-3 and Symphony, Byers added, SQZ is intended for users of large symmetric transmit spreadtheet and especially for those who transmit spreadtheet data registry, according to byers. He said a

150K-byte 1-2-3 file that normally takes 20 minutes to send at 1,200 bit/sec. can be transmitted in two min-

sec. can be transmitted in two min-utes after compression by SQZ.

The program takes 30K bytes of memory, allows password protection for encryption, is not copy protected and supports the Lotus/Intel/Micro-soft Expanded Memory Specifica.

tions for use with memory expansion

boards.
"We've sort of cut our teeth on Lotus enhancement products," Byers
sald. The companion Note-It product
provides a pop-up notepad in midseasion with another program.
"Turner Hall also will join with Microsoft Corp. to promote SQZ and the
computations, program, Microsoft. communications program Microsoft Access, Byers said. But he hopes to draw on the market of almost two million 1-2-3 users who appreciate

the ability to squeeze data for storage whether or not they transmit it. The program is also compatible with other popular RAM-resident programs by following tentative industry guidelines for RAM-resident program development, according to Byers, SQZ was developed by Synex Systems Corp., in Vancouver, B.C., Canada, which retains rights to the product but gave Turner Hall exclusive distribution, Byers said



From page 35

many others.

Some or all of the extended memory also can be used as a RAM disk, making it look to the system as if it were a Winchester drive. Since the were a Winchester drive', since the contents of memory are lost when power is turned off, this cannot han-dle permanent data storage. Rather, frequently accessed files such as Help files are copied to it in order to consol more than executive. speed program execution.

speed program execution.

The software accompanying the Above Board PS also includes some very convenient features. In addition to basic software to help configure and test the memory board, it includes support of a print buffer. Of fering background speofling of long print gols, the buffer actually is left and the print buffer. The configuration of the print board was a support of the print board of the prin find most useful in daily operation. Even handier, however, in the abil

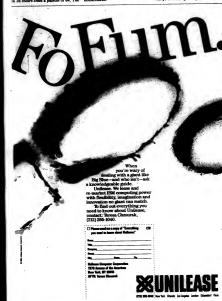
Even handier, however, a the abitity to evoke the print program by pressing the shift key along with the print screen key. This pops up a two-line menu on at the bottom of the display allowing the user to cancel a print job, print the current contents of the screen, pause or resume the printer, do a form feed, reset the printer or exit back to the program

currently in progress.

The Above Board PS' docu tion is excellent. A tremendously use-ful brief manual aimed at experi-enced users also is provided. Listing at \$1,195 with 1.5M bytes

of memory, the Above Board PS is an excellent way to get more value out of older IBM and compatible personal computers.

filling in the board themselves can get Above Board PS with only 256K bytes for \$545.



Concurrent introduces supermicro

By James Connelly HOLMDEL, N.J. HOLMDEL, N.J. — Expanding its 7-conth-old line of Unix-based systems,

month-old line of Unix-based systems, Concurrent Computer Corp. announced a supermicrocomputer and plans for a high-end supermicromputer. Concurrent, formerly the data systems group of Perkin-Elmer Corp., introduced the XF/300 as the sixth member of the Xethe Ar/300 as the saxta memory of the Ar-los family of Unix systems, which were in-troduced in September. The company also said it will introduce a top-of-the-line XF/ 800 supermini parallel processor later this

year.

The XF/300 supermicro, like the lower end XF/200 and XF/210, runs Microxelos. Concurrent is enhanced implementation of AT&T Unix System V Release 2.

The XF/300 is bullt around the Motorola, Inc. 68900 CPU and uses a dual-bus architecture and 256K-byte random-access memory (RAM) chips.

It is packaged in a desk-high enclosure and features a capacity for 18 B2-233C ports, 1M to 4M bytes of memory, up to 177M bytes of formatted disk storage, a 1.6M-byte floppy disk and a 17M-byte tape cartridge. Options include a floating-point processor and an Ethernet controller. A minimum XF/300 configuration costs

A minimum XF/300 consiguration costs \$14,000. Concurrent said that applications writ-ten for Microxelos are source-code compat-ible with Xelos, the operating system of Concurrent's larger scale Unix-based sys-

tems.
Concurrent also announced its Online
Software Change Request (SCR) Entry Serreporting forly wars bugs and enhancement
requests directly into Concurrent's SCR
system running under Aelos and Concurrent's SCR operating under Aelos and Concurrent's SCR operating to the service of th

Supercomputers go to work

Vector processors mean new benefits, new snags

By Donna Reimondi

NARBERTH, Pa. — Vector processing
machines, necessary tools in the scientific
research and development world for many

years, are starting to appear in commercia businesses that have scientific needs. On such business is finding that breaking into entific needs One the world of vector processing is br nefits — and prob untered before.

nuntered before. Pive years ago, Solution Systems, Inc. arted selling time on a superminionater. This was a new twist in time-sharing, since companies usually cold their serces on large maintrane computers, says what on President Neil Kleeman. Now the

1985

company is using a similar twist of tech-nology in its move from time-sharing su-

cessing minimpercomputer.

Kieeman says he is thrilled with the power at his disposal on the C-1. But converting programs, developing communications links and getting used to a totally dif-

ferent operating system is not always About half of Solution System's use

fall into the data management category.

Those customers have fixed monthly john to do and pay a fixed fee. The other balf

to oo and pay a fixed Jee. The other bit are engineering and scientific customs who do jobs on a project basis.
Both enstomer types have been runnion the company's three Prime Computer line. 5065 superseline. We are running on Soc Superseline.

INSIDE GE introduces a

high-end 3-D graphics proces sor/42

Harris offers an IBM 3270-compatible terminal/44

3M announces developments in the optical disk storage field/44

NEW THIS WEEK

Hewlett-Packard introduces a tane subsystem for unattended backup

For more on this and other new products, see on, 97-118.

INSTANT ANALYSIS

"The message is starting to get out that DEC is a competitor worth considering, and not just for a departmental system. I am getting a lot of questions

from large organizations that say they are consider ing going all

Data Corp. analysis Richard Mikita

ITT Oume adds high-function terminals to line

17T Qume has introduced two new ter-minals: the \$655 QVT 119 Plus, which it claims is the most powerful ASCII device available, and the \$495 QVT 101 Plus

smart Lernfaral. According to Keith Rapp, Quine terminals division vice-president and general manager, the QVT 119 Plus' features' 34-low the user to Justice and distinct to being compatible with the QVT 119, the 14-in. 119 Plus emulates. Applied Digital Data Systems, Inc. 19 Verspout AZ, Wight Technology, Inc. 19 Verspout AZ, W

Advanced features of the 26-line 119
Plus include 132-col. support in both single
screen and horizontal scrolling modes, embedded or nonembedded attribute selec-

Non-Unix expandable superminis out from Alpha Micro

Business users targeted: AMOS may be drawback

By David Bright
SANTA ANA, Calif. — Bucking
the supermicrocomputer trend toward Unix, Alpha Micro Systems, inc. recently introduced a family of expandable Motorola, inc. 68020ed supermicrocomputer system that support as many as 240 users under the company's proprietary AMOS operating system. Rather than compete against Unix-

based supermicrocomputers from companies such as Altos Computer Systems, Inc. and NCR Corp., Alpha Micro officials plan to pit the systems

miniconputers from companies like Digital Equipment Corp., Data Gener-al Corp. and Hewlett-Packard Co. Employing the VMEbus, the sys-tems use a 32-bit 68020 running at 16 MHz and Motorola 68000-based 1/0 and disk controllers reportedly to op-erate at an average of 3 million in-

In the five-model series, random access memory (RAM) ranges from 2M bytes to 28M bytes; disk storag ranges from 70M bytes to 2.4G bytes ranges from 70M bytes to 2.4G bytes.
Upgrades from the company's AM1500 systems, which use a Motorola
68010 on the VMEDua, will be available for about \$11,000, according to
Gary Nelson, director of product
marketing.

Nelson claimed that more than 20,000 Alpha Micro systems are in-

"We have designed the AM-2000 for business users who need a powerful, easy-to-use and easy-to-expand, multiuser system that can grow to meet their changing needs without uiring a change in software. hard Cortese, president of Alpha

But because the systems use the proprietary, little-known AMOS, ob-servers question their potential ap-

Despite what he called attractive pricing. Rich Mikita, a senior re-search analyst at international Data Corp., a Framingham, Mass.-based market research company, said the arch company, said the fact that the systems run under AMOS is "potentially a problem. Poo-ple are going to be concerned about

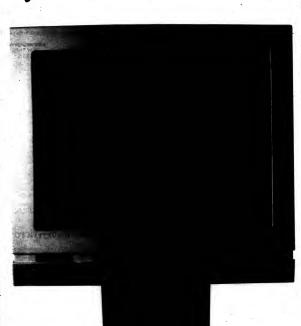
ing system like that.

Since most microcomputer sys-tems based on the 68000 family fea-ture some version of Unix as the ain operating system, the concern about the availability of software for Alpha Micro's systems, Mikita

Cortess countered that more thi 600 software packages are already available for the systems and that Unix applications can be ported to AMOS with no more trouble than the the porting between two versions of

AMOS is a "very reliable, high per formance product" that operates more efficiently than Unix, he contended. "The problem with Unix is See ALPHA page 46

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GE unveils its first 3-D graphics processor

Graphicon 700 designed for high-end competition

By Revenuery Namilities
RESEARCH TRIANGLE PARK,
N.C.—General Electric Co. 's Silicon
Systems Technology Department
(SSTD) introduced a three-dimensional graphics processor earlier this
month that was designed to compete
with product offerings from such

d graphics workstation ven-Silicon Graphics, Inc. rs as Sili ors as sucon Graphics, inc.

SSTD said it plans to sell the Gradicon 700 to OEMs, including GE's

shima divison, which is a vendor of

imputer-aided design and engineering workstations. SSTD said it will be shipping the graphics product within 90 days of

order.

Calma announced that the Graphicon 700 will be available as a hardware option in the fourth quarter for
its Digital Equipment Corp. Microvax
Il-based workstations.

No pricing is available yet for this

The Graphicon 700, which SSTD will sell for \$64,900, is made up of five very large-scale integration chips built around a multiple-bus ar-chitecture. It comes with 4M bytes of

bytes, four RS-232 serial ports and a printer interface.

SSTD also plans to sell a fully con-figured version with a terminal, mon-itor, host interface, documentation, training and support for a cost of \$55,800.

505,900. The fully configured version has such a slight price difference because the company is primarily concerned with the OEM market, according to a

any spokesm The Graphicon 700 is GE's first commercial offering in the graphics processor market. It was designed for

and graphics-intensive applications in the architectural, medical and scientific fields.

GA extends Zebra family, enhances line

By Bonna Raimondi ANAHEIM, Calif. -- General Auto

mation, Inc. (GA) has announced two models in its Zebra family of Pick Systems Pick-based computers and enhancements to its existing Zebra

The \$118,900 Zebra 7820 busin applications system is the company's at twice the speed of the company's er high-end Zebra 6700, based on benchmark tests the company per-formed. The 7820 unit also has double the terminal capacity of the 6700, up to 128 terminals. It is available to business applications-oriented com

business applications-oriented com-puter dealers, the company said.

"GA's new high-end system is quite impressive," said Chandru Murthi, Pick analyst at Opsys Con-sultants in San Francisco. The com-pany's products have had a good rep-utation in the Pick world, he said, but financial problems in the past year have made it hard to gauge their im-

ertunce in that market. The high-end announcement will make the company more competitive with supermini makers. GA's low end has always been its forte, Murthi ex-

The system's CPU uses a 20 MHz, 32-bit Motorola, Inc. 68020 proces-sor. The base configuration includes 32 asynchronous terminal or printer ports, 2M bytes of memory, a 6,250 bit/in. ½-in. tape drive and 260M bytes of fixed disk storage. Memory is expandable to 8M bytes and for-matted disk storage to 2G bytes. Options include additional parallel

printer ports, a Zebra local-area network system and remote binary synchronous communications for con-necting to IBM mainframes.

Low-end, stand-alone unit

The low-end Zebra 1350, offered to dealers, resellers and OEMs for vertical markets, is a six-user standalone business unit. The 1350 is priced in OEM quantities (100 or more units) from \$6,395 to \$8,000, depending upon options. It employs a 10 MHz Motorola 68000-based CPU, 256K bytes of memory, 20M bytes of disk storage, six serial I/O ports and one parallel printer port.

one parallel printer port.

Software that comes with the system includes word processing, business graphics and spreadsheet packages. The 1350 can be ordered with an optional 512K-byte memory.

A performance enhancement kit for the Zebra 6700 was announced also. The kit includes a 16.6 MHz Motorola 68020-based CPU, a 2M- byte memory board, a multibus chassis, a backplane, an I/O chassis and the adbackplane, an I/O chassis and the ad-ditionally required Pick license. The kit costs \$19,000 and replaces the current configuration that is Motor-ola 68010-based.

Also enhanced were the Zebra

3750 and 5500E models. Both models now offer a 12.5 MHz CPU as opposed to the earlier 10 MHz version. The basic cost of the Zebra 3750 is \$29,98 while the quantity-one price of the Zebra 5500E has been reduced from



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Harris printers, terminal out

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market line printers, on 8 5 ady/rain
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terminant with an enhanced to yhourd.

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according to Harris. A 300 line/min version of the printer, with a near-letter-quality capability of 90 line/ min, is available for \$11,500. Both ers are customer-installable and le six-part forms up to 16-in

\$6,600 H165 Desktop Laser Printer has 300 by 300 dot/in. resolution and a duty cycle of up to 5,000 pages. Functionally equivalent to the IBM 3178 terminal, the 12-in. H178

22 unit comes with a 122-key key-The \$1,480 terminal's keyboard features the same layout as the IBM 3179 and 3180 terminals as well as the 3270 Personal Computer.

L/F Technologies unveils high-end version in multiuser micro series

CARSON CITY, Nev. — Adding support for additional users and a built-in uninterruptible power sup-ply, L/F Technologies has introduced a high-end version of its 1600 series work-in-a-box.

of multiuser microcomputers.

The 1660 reportedly supports up
to 30 users on the company's Turbodos operating system, improving
upon the 16-user maximum of the
earlier 1640 system.

The 1650 uses 10-MHz Intel Corp.

The 1650 uses 10-MHz Intel Corp. 80186 microprocessors and allows each user 1M byte of memory. It uses L/F Technologies 1M bit/ sec., 8-bit-wide, bidirectional paral-lel, S-100+ Bus architecture to pro-

vide what the company called a net-

Data transfer on a priority basi The architecture links separate

microprocessors for each user, allow-ing data transfer on a priority basis with no-wait states, according to the company. L/F Power, the built-in power sup ply, reportedly provides one hour of power for the 30 users. A basic system with 1M byte of

memory starts at \$7,500. The company said a per-user aver-age price is \$1,700, including termi-

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*Costs based on total cost of ownership (list price and maint QCWs G 1956 Youg Laboratories, in-

departmental processor, a none in aus-tributed processing network, or as a small business computing system. And because these new systems are all part of the Wang VS family, they all support the same languages, applications and protocols, and offer an easy

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WANG

3M announces optical disk-based document system

By James Connolly MINNEAPOLIS — 3M Corp. re cently announced developments on two fronts in the optical-disk storage field, including an electronic docu-ment management system.

ment management system.

On one front, the company introduced its Decutron 2000, which includes components built for 3M by
Toshiba, Ld. The self-contained system consists of a 3.6G-byte optical disk drive, scanner, display screen, laser printer, keyboard and electron-

le control system.

3M officials said that the basic system will store 60,000 letter-size documents on the 12-in. disk and that The scanner reportedly can scan

documents at either 200 or 400 pixel/ in. and detects 64 shades of gray. The Docutron 2000 will be avail-The Docutron 2000 will be available in July at a cost of about \$100,000, according to 3M officials.

3M also announced a cooperative agreement with Reference Technology, Inc. under which customers can use a single-source procedure to combine Reference Tew with 5M a disk-replication process for compact-disk, read-only memory media. read-only memory media.

LSI Logic designs microchip method

MILPITAS, Calif. - LSI Logic Corp. has announced a proprietary design technology that reportedly allows it to develop application-specif-ic microchips faster than convention-

al approaches Macgen, the megacell compiler set-vice for buyers of LSI's application specific products, works with LSI's LDS chip design system. It reportedly generates very-large-scale-integra-tion-type functions on chips smaller than those produced conventionally. LSI uses Macgen to design custom megacells in its products.

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- Car

Dual announces VMEbus-based supermicro

Multiuser 32-bit system supports Unix version

ERKELEY, Calif. — Emphasizing open architecture, Dual Systems announced a 32-bit super-

The supermicro, known as the Chaparral, reportedly is built on the 16-MHz Motorola 68020 microproces-sor and supports Dual's version of

A company spokesman said the system, which was installed in beta test sites last year, provides for ex-

elity and migration with an

The supern ions, such as office automation, uter-integrated manufacturing, uter-aided engineering and data

In addition to the 68020 CPU, the

cessor for paged memory man-ent, which forms a virtual cache ary system with a 4G-byte ad ssing range; a Motorola 68881 sting-point coprocessor for high-sed computing; and 1M byte of ran-

The system is available with Du-

al's VMEbus Enhanced Small Device Interface (ESDI) or VMEbus Storage

ale Device The Storage Module Device con-troller reportedly handles up to three disk drives with a 2.4M byte/sec-data rate, while the ESDI controller

handles up to four drives at 1.25M According to the vendor, the sys-tem will be sold through OEMs, val-

ne-added resellers, systems integra-ors and distributors. A basic system with eight ports and a 44M-byte disk drive costs

\$14,900. A high-end system, includ-ing the Storage Module Device con-troller and a 337M-byte disk drive,

ITT Oume adds terminals to line

tion, reconfigurable page lengths (up to four pages) and a split-screen capability. As an option, the 119 Plus can offer its added functionality in both native and emulation modes.

Other features reportedly include an integrated clock and slarm, double height and width characters and 44 ogrammable functions. To make em more noticeable, the spokesman id, the function keys are round

said, the function keys are round rather than square.

Rapp claimed the QVT 101 Plus of-fers high functionality for a low price, The 101 Plus emulates Applied Digital Data Systems' Viewpoint A2, Hazettine Corp.'s 1500, Lear Stegler, Inc.'s ADM-3A and Televideo's 910.

920 and 925. The 14-in. terminal offers 16 round function keys and up to 44 pro-

grammable functions, a bidirectional printer port, an RS-232 interface and a detached, adjustable-tilt, low-pro-file keyboard. With its four pages of memory, ac-cording to Rapp, the terminal is ideal for word processing applications.

Available options include an amber screen as well as a current loop or RS-

422 interface. Both terminals are available now

Alpha Micro unveils superminis

From page 39

not so much at the end-user level where they are buying solutions. The problem is with the value-added re-sellers and the software developers." He added that AMOS supports popu-lar languages, such as C, Fortran, Pascal and Cobol, and that Alpha Mi-ero does, in fact, offer Unix. However, because AMOS is more powerful and flexible, Unix has not been a big seller on the Alpha Micro systems, Cortese said.

Cortese said.
With its greater capabilities, the new series "opens the doors to the kind of customer we previously had to say "I'm sorry" to," said Tom Fox, president of Foxware Systems Corp., an Alpha Micro reseller. According to Fox, such customers include th who might otherwise buy HP or DEC Based in Irvine, Calif., Foxware

has been reselling Alpha Micro sys has been resetting Alpha sicro sys-tems to manufacturing, medical, le-gal, dental and other vertical mar-kets for five years. During that entire time, Foxware has not sold even one system with Unix, according to Fox. Although the AM-2000 systems do of festives a majorgram operation e a mainstream operating system, Mikita expects their price/ performance to attract a lot of inter-est and at least stimulate the market

An entry-level system with 2M sytes of RAM, a 70M-byte disk drive,

12 serial ports and the AMOS operat-ing system retails for \$22,000. Prices range to about \$325,000 for a 240-Deliveries are scheduled to begin

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The PC/XT's "mirror image"

The Tandy 1200 works like an IBM PC/XT-but costs much less. The 1200 runs the same top-name software and supports the same hardware as the PC/ XT. Of course, this is great news for the first-time user. And if you're already using one or more IBM PC's in your office, the Tandy 1200 lets you expand for less-and continue using the same

quality MS-DOS software and expansion boards that you've been using.

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SYSTEMS & PERIPHERALS

Supercomputers go to work

From page 39

achine for data management, one achine for scientific/engineering d a third runs Prime's Medua com-ster-aided design package," Kle-an says. But new scientific and en-neering customers will be added to e fledgling load on the C-l that was divered the day after Christmas

The company decided in April 1995 to investigate parallel and vec-tor processing machines and decided to tray the C-I because it had 25% of the performance of a Cray nescal-inc. Cray 1 and 10% of its price, Kieee of a Cray R

"We had already justified the \$600,000 price tag for a new 9805, and we discovered that for a little nore, about \$700,000, we could have a machine that was 10 times faster. It's the kind of thing that let us get into business in the first place," says Kleeman, noting that Solution Sys-tems originally bought a prime 780 to do work normally limited to a much

do work normally limited to a much more expensive system like a Control Data Corp. Cyber 206. Kleeman claims that he can pro-vide throughput that is about the same as what a user gets on a busy Cray. "And when the Convex reaches that kind of load, we'll get another

" he save The C-1 runs under the University of California at Berkeley 4.2 version of AT&T's Unix and has 32M bytes of emory, a CPU with vectors, a diagnostic proce

with its own hard disk and cartridge tape unit and a multibus card cage. The system is 2 ft wide and hangs on two 19-in. racks, according to Klee-man. "It's half the size of the 9955s and a lot quieter," he says.

Converting existing applications to the Unix-based system has some-times proved to be difficult. The company has worked with its third-party software vendors, using versions of programs that were created to work on the Digital Equipment Corp. VAX series muchines, the Cray systems under Unix instead of using the evidence of the control sions written for the Prime systems The VAX, Cray or Unix versions are

h easier to convert to the C-I, Kleeman says. On the downside, some of the programs we use are very scalar in

them on the Prime systems or work with the authors to rewrite them," he says

hè saya.

Rewriting has been necessary for a
fluid flow program called Fluent,
from Creare, inc. in Hanover, N.H.
Solution Systems and Creare are
working together to make Fluent
work on vectorized systems.
Other programs have run with few
revisions. Staad 3, a structural engi-

revisions. Staad 3, a structural engi-neering and design package from Re-search Engineers, Inc. in Cherry Hill, N.J., "really burns" on the C1, Klee-man says. "It's been running on the Prime all this time, and it's 20 times feature on the C1."

faster on the C-I. Convex helped the company to convert a DEC VAX VMS operating convert a DEC VAA VMS operating system version of the Ansys struc-tural analysis package from Swanson Analysis Systems, Inc. in Houston, Pa. "They took the VMS version and converted it in two weeks' time to Units and now it true flue to 10 times Unix, and now it runs five to 10 times faster than it did on the VAX," Klee-

man says. mer programs also have to be Customer programs also have to be changed to run on the new system, kleeman says. "If a user wants to bring his Portran program over, we'll try to compile it on the Convex." After finding syntactical problems and running the prógram through the Convex diagnostics, Solution to the convex diagnostics, Solution to the synthesis of the convex diagnostics, Solution to the convex diagnostics, Solution to the convex diagnostics, Solution of the convex diagnostics, Solution of the convex diagnostics and diagnosti change the program

It usually takes about a week for customers' program differences to be resolved. Kleeman says, "In some es, the programs run really well, and we don't have to do much.

Switching prob In trying to hook up the C-1 to So-lution's packet-switched network system, Kleeman discovered that the X.25 multiswitch he bought would not switch to both the bisynchronous protocol used by the Prime machines and the High-Level Data Link Control protocol on the packet assembler/dis-assembler used by the C-1.

The switch was supposed to direct one X.25 link to all the company's computers. "I'd be lying if I said it wasn't a problem to hook up," Klee-

man savs man says.
"We had to get an upgraded packet assembler/disassembler and find the right people to tell us that we could have them taking different protocols, but they had to be on adjacent ports," he says. The frustrations of dealing with the multiswitch vendor come from being a different kind of C-I user than the usual highly tech nical research people, he says.
"We have a much greater require

we mave a much greater require-ment for things being easy to use and easy to log in," Solution's president says. "We have less control over the end user because they are clients, not employees. We have spent a fair amount of time making sure that the communication works easily and that the scripts are written that make the

programs easy to use."!

Programmers at Solution Systems had to learn the Unix operating syshad to learn the Unix operating sys-tem, which is not an easy one to learn, Kleeman says, adding, "They have become pretty proficient." The firm also had to design an ac-counting system for the C-1. "Each of

these little projects can take a month or so. That, in addition to the conversion, has brought us pretty much to April before we can unleash this thing to our customers," Kleeman

FOR THE PRODUCTIVITY MINDED

mdbs



INSIDE

to the last of the

The documentationmaintenance link/50

Are controls the answer to defect-free maintenance? An interview with William E. Perry/54

Using walk-throughs to uncover hidden faults/57

Selection, budgeting and supply — the barriers to tool acceptance/62

Software maintenance Managing change at the dawn of a new era

By CAPERS JONES

At some point between now and 1996, a dramatic transition will occur in the history of computing and software. From that point on, more than half of the programmers in the U.S. will work on maintaining and enhancing existing programs and systems rather than developing new

ones.

Although the transition point lies a few years in the future, computer managers must start zoon to prepare for the acquisition may be added to the start t

Six major trends will characterize the coming

era:

Organizations will sponsor new recruiting and training efforts aimed at nurturing skilled maintenance apecialists, who are in abort supply today.

More and more companies will establish for-

Jones is chairman of Software Productivity Tesearch, Inc., a consulting firm based in Acton. mal maintenance departments to coordinate and support the growing corps of maintenance pro-

Data processing shops will adopt the practice
 of analyzing production libraries to select candidates for seriatric care.

dates for geriatric care.

• Managers will measure productivity according to new standards that take into account the large differences between development and maintenance work.

ment and maintenance work.

• Companies will regulate end users' software development efforts to overcome the maintenance problems that fourth-generation languages of-

ten cause.

 Organizations will invest in specialized maintenance tools and maintenance workstations as they become

available.

Managers who expect to stay

ahead of the game should take tim

now to consider each trend in turn

now to consider each trend in turn.

Nurturing maintenance specialists. The skills
that programmers need to succeed at a maintenance project differ somewhat from the skills
they use for new development. Maintenance work
requires a great deal more patience, for example,
both for working with source code that someone
cles wrote and for trudging line by line through

s to select candiductivity accordinto account the

> The continued modification of aging, unstructured software ranks as the most difficult kind of programming. Yet it seems destined to become the most common.

Managing change at the dawn of an era

rge volumes of code, day in and day out.
Unfortunately, only a few universities teach manage, so typical software engineering graduates kept to nothing about the field. Many business organical sections and discounters of the section of the sectio tions are starting to create their own con e gap. Other companies hire private con nce training

es that support development as that support development as distinct entities often proiong the following line

First, they give all new software eng re introductory course that covers both the develop-ent methods and the maintenance pany employs. Such courses run from two weeks to maps three months. At the completion of the training, each grad

ers' salary lev-In such firms, mainten els match those of develop groups receive equal opportunity for promotions. M over, a programmer can typically transfer from one department to the other as his interests change. Such

7

yee morale mb as well.

ITT's Advanced Tech-ology Center in Strat-rd, Conn., and The Hartford Insurance Group of Hartford, Conn., used the approach to their advantage, as has the Gen-eral Products Division of

staffed remain something of a rar-ity today. In most shops, development personnel

work as needed.

But allowing program-mers to divide their loyalties brings on two critical

maintenance projects often take such high priority that they interfere with new development.
 The impact of splitting assignments lowers programmers' productivity for both maintenance

and development. Most companies start feeling the effects once

recting the affects once their production librarian lines of Cobal source code, and any company that reaches this mark should legisl not to that a based establishing a distinct estimates one code the collision librarian states of the control of the reaches of the control of the control of the collision of code the collision lines of source code books act to make the missenance despired as early the that supports a production library of that size typically that supports a production library of the control of the control of the collision of the control of the collision of the control of the collision of the collision of the collision of the fact year. If a company replays the equivalent of 50 full-time people for a task, that the require sum

A nalyzing production libraries. Corporate pro-duction libraries grow slightly larger and slight-ly older every year because companies add new applies tions faster than they retire aging software. But aging systems destabilize over time — a phenomenon known as software entropy — so this growth cannot continue

nchecked. Unless a firm takes remedial action to duce entropy, maintenance becomes exceedingly cult and time-consuming. ection library analysis, a new software engi

Production library analysis, a new software engi-neering discipline, ewichs toward a solution. Program-mers trained in production library analysis study large volumen of existing software to injunionit problem areas. They then develop methods to stretch out the useful like of the aging upplications they discover. Analysis serve to Indicate which of four general options a company should take for a given application

options a company should take for a given appreciation.

Option 1: Preservation — If users feel satisfied with
the program's functionality and analysis shows that
the application is well structured and easy to maintain,
the company should preserve the application indefi-

nitely.

Option 2: Restructuring — If users feel satisfied with the program's functionality, but analysis shows that the application is poorly structured and difficult to maintain, the company should mark the application as a candidate for restructuring.

Option 9: Enhancement

 If users need more functionality than the program supplies but analysis shows that the application is well struc-tured and easy to maintain, the company should add functionality to the existing code rather than

> Option 4: Replacement
>
> — If users need more
> functionality and analysis shows that the application is poorly structured and difficult to maintain. the company should com-pletely replace the appli-cation. If managers con-

> sider the application too critical for near-term replacement, they should slate it for immediate re structuring and start plan

ople who perform the continued modifica-tion of aging, unstruc-tured and high-entropy software ranks as the most difficult kind of pri gramming. Yet it seems destined to become more

Productivity rates will drop, in turn, and managers will need to adjust r expectations accordingly. Maintenance productiv

try differs dramatically from new development productivity. Besides requiring more coding time than development work requires, maintenance work follows an

openent work requires manifestance work requires maintening different productivity curve.

carry higher productivity raises and lower costs that aggre programs. But for maintenance, very small changes often carry much lower productivity raise and hower costs that happer programs. But for maintenance, very small changes often carry much lower productivity raise and higher costs than larger ones—mainly because programmers need to spend a great deal of time studying cristing code before they can begin even the smallest of

mountramoves.

Indeed, the overhead costs associated with explorin existing software run so high that changing one or two lines in an existing large system may cost up to 1,000 times more than creating one or two lines of code for a

Expert's Opinion



Making a case for solid documentation

BY NED CHAPIN

fixtion.

Pirect experience carries with it
sherest weakness: the normal
man process of forgetting. In time
ple forget most of the things they

rear feedules the ful.

This is not to say that experient
a weethless, By weeking directly
with a piece of software, a program
are picks up a general understand
ag that will guide him in the futu
till, he loses specific details rapie
and cannot reacquire them without

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Interview

Defect-free maintenance a priority as DP focus shifts

variety of work challenges and dead-They also feel, however, that ance work is often not recog nized by management, and so it be-

many people nance work.

My expe

77

While new development is becoming a science with wellestablished methodologies. maintenance is still practiced as an art.

shown me that in many companies DP management spends about three quarters of their time on new system technology and a very small segment of their time on maintenance.

DP staffs perceive this as a man ent lack of interest in mair nance. They feel that managers do not think of maintenance as important because maintenance doesn't receive much manager

Do you think there is a changing focus toward maintenance work from development work in most data processing shops today? And are most MIS/DP managers aware of this shift in work flow? I think many managers are av

that there is a shift going on, but I don't think that they are aware of the impact that shift will have on their organization. They are not pre pared to handle more maintenance

What can managers do to pre-pare for this change in work flow? A good first step is to develop maintenance methodologies. While new development is becoming a science with well-established method gies, maintenance is still practiced as an art. In many organiza-tions, maintenance programmers are allowed to maintain code in any manner they choose to maintain code.

Do you recommend that shops use a specific software mainte-nance methodology and stick by it? I don't believe a single methodolo-

gy is the answer because there are too many varieties of development styles that are used in organization - some companies have asser some have fourth-generation lan

For that reason, I think there will be different work patterns and meth-odologies — but they have to be

I also feel that companies should stop doing continuous maintenance and go to the release method, where you bunch all of your mainte work together and put it in n

stenance is extremely ineffecmannenance is extremely ineffective when a continual string of changes is run into a system. Vendors of software learned that lesso in the late 1960s.

note mainte animations? Manageme Management must recognize that there are different job functions that require different work patterns. They need to reward staff members on the perceived importance of the work being done. Whatever man agement rewards is what tends to be done. So basically they have to ige their attitude and philoso-

In addition, they have to adopt thodologies, and they have to have appropriate reward systems for the maintenance people. Rewards not only in dollars, but in promotions and personal recognition

Is creating separate mainte-nance/development groups a goo idea?

I'm not sure that the separate oranizational groups are essential, but I do think it is essential that there is a group responsible for the maintence process Oftentimes what I find lacking in

companies is that nobody is responsible for the maintenance process. Someone has got to give maintena people the appropriate tools to do their jobs

Are tools used effectively in the maintenance arena? In general, managers often don't understand the maintenance process, and if you don't have basic informstion on a topic then you don't know

where to apply your tools.

Many firms haven't put into effect
the basic measures that tell them what maintenance is, what mainte-nance costs, when it is done effectively and when it is done ineffec-

In other words, they have never done systems analysis on the maintenance process. We find in our institute that m tenance is three to 10 times as de-

fect- or error-prone as new system development. That's generally not spend about half the time on testing as programmers do in software development.
We are advocating more reviews

and more maintenance inspections, which provide a more rigorous analysis of a project than a maintenance

What do you see as the biggest challenge for software maintenance programmers?

Their biggest challenge is to do maintenance in a defect-free man

Do you have any final recomm dations for our readers, the MIS and DP managers? Yes, managers have to go out a measure, the mainte-m. Because what you ne or m

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Executive Report Software Maintenan

Continued from page 60, peak when the size of the update is between 1.5% and 3% of the size of the original program. Smaller changes carry their tremendously, high overhead costs, and larger changes usually require some internal modification of the existing code

naintenance productivity more than programmers can make a change to a well-structured program in about one-quarter of the time they need to make the same change to an unstruc-

tured program.

The added effort goes mainly toward making internal changes to the existing code. Coupling new code to n unstructured program require sany more internal changes than

ding new code to a structured

couping new to-program.
Further, these internal changes carry with them a high risk of intro-ducing new bugs to the system, which drives up the time and cost of testing and slows down the coding testing and slows down the county effort. A programmer is about twice as likely to introduce bugs to a poor-ly structured program as he is to

aintaining end-user appli-cations. The proliferation of fourth-generation languages and the subsequent emergence of appli-cations written by end users affect maintenance in ways that many

managers do not expect.

Companies that experiment with
many different fourth-generation languages, for example, often find that their programmers cannot main-tain certain applications because no one ever trained them to understand the languages in which the applica-

tions are written. Applications written in fourthgeneration languages can also pose tremendous maintenance problems because the people who code in such languages — end users, especially — often code carelessly.

End users rarely follow tried-andtrue development methods and usu-ally show little sensitivity to maintenance needs. Specifically, they do not think to insert comments in their programs, use structured programming procedures or produce sufficient documentation.

Their lack of discipline may not

pose a problem if they maintain their own systems. But if an end user quits or changes jobs after his company develops a dependency on his appli-cation, the company will find itself in a fix. Maintaining a user-developed program after the user leaves the company is almost always a di-

To overcome the maintenance problems associated with fourth-generation languages and end-user applications, a company should en-· Select a single, standard fourth-

generation language for company-wide use; allow no others. · Demand that end users follow normal development methods for any application that might become important to the company's opera-

These policies will never win any popularity contests, but they will keep a company's maintenance costs from skyrocketing.

Buying maintenance tools. The commercial tools currently available for maintenance pale in comparison to those available for development. Whereas development programmers can buy a program-mer's workbench that includes a variety of integrated tools, mai nance programmers can only acquire a tool at a time.

Still, some large corpora developed sophisticated mainte-nance workbenches for their own internal use. The features of such cause vendors seem likely to begin offering similar packages within the next year. Most internal mainte-

WHAT THE EXPERTS SAY

The tool the maintainer most needs is an interactive code analyzer that will help him understand how the code works and to predict the side-effects of modifications."

- James Martin Maintenance of Computer Programming Savant Institute, London 1982

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nel that a company win security and the existing production it ry and all new applications.

Global data dictionaries that at our where all variables and ta frems fall within all major appears to the existing of the existing and the r changes a variable, this nere-used information neigh nim ace the change globally, at every

The overhead costs associated with exploring existing software run so high that changing one or two lines in an existing large system may cost up to 1,000 times more than creating one or two lines of code for a new system.

o Pull source-code control mea-ares and formal promotion methant together protect the product brary from corruption. Control otion meth tibrary from corruption. Control measures, especially the provision for a locked master copy of all applications, keep track of existing code. that new code meets strict sta

before it gets released to the produc

tion library.

• Automated source-code analysis tools that evaluate a program's maintainability and monitor its adherence to local standards of program struc

Tools that restructure and redocument existing programs. These tools can reduce the complexity of

aging software and thereby extend its life. They can also structure and nt new programs to ensure

occument new programs to ensure consistency.

• On-line catalogs of fault reports, which provide automated analysis of defect origins and warnings of error-prone modules.

• Corporatewide catalogs of reus-able application designs and source code modules.

R ight now, took and manage-ment practices are not devel-oped as well as they will need to be once the age of maintenance begins. But progress toward that end mounts

But progress toward that end mounts werey day.
Within a few years, the tools and methods available for software maintenance will approach the level of the tools and methods currently available for software development. Data processing shops are already beginning to focus on maintenance by recognizing it as a distinct professional activity, and maintenance partners are becoming with shore. place rather than rare, with shops like The Hartford and Bethlehem Steel Corp. of Bethlehem, Pa., lead-

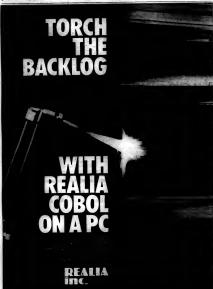
ing the way.
In addition, maintenance special ists are appearing in increasing num-

bern.

Moreover, managers and senior
executives are starting to recognize
the hazards of aging production li-braries. In turn, they are factoring
the replacement of critical systems
into cost/benefit analyses and corpo-

rate strategic plans.
This transition from new deve ment marks the normal aging of the computer industry, whose 50th year will more or less coincide with the transition point, and the new empha-sis is by no means unique or forebod-

The automotive industry observed a similar phenomenon after only 30 years of production, and Detroit continues to generate a healthy business, albeit a business with more Continued on page 62



NEW FOR S/38

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Until Teflon products showed up the market, people never felt a god for them. Someone might comneed for them. Someone might com-ment, in an offhand way, "Wouldn't it be nice if food didn't stick to

second thought.

People take little interest in prod-ucts they have never heard of, which is why most data processing shops do not train their staff members in

Until a few years ago, mainte-unce training did not exist. It is still datively rare and terribly under-

One can easily lay blame on the tion's universities. No leading colpart of its computer science degree program, and very few offer mainte program, and very few offer mainte-nance even as an elective. Morrover, the universities are unlikely to change their ways in the near future unless accrediting organizations push for such changes. But the business community shares fault for the lack of emphasis Most data processing organizations

sharer fault for the lack of emphasis. Most data processing organizations remain completely unaware of the need for maintenance training. Trade organizations and softwarfevendors are beginning to improve the situation by offering specialized maintenance training programs. Notable among these are the Association for Systems Management, the Data Processing Management, the Date Processing Management, and Catelon and IBM. Independent commiting firms sponsor training courses as well. As such groups expand their efforts and promote maintenance training, the idea should begin to

catch on:
Businesses already recognize the
value of training for software development, and management impleopment, and management implements impressive educational programs. No one was born speaking
Cobol, and no one learned it at his
mother'a knee, yet most programmers know the language. Some studied it in school, but many learned it
only after they arrived at work. In
topics less fundamental than Cobol. topics less fundamental than Cobo almost all programmers learn the ropes through either on-the-job tu-toring or job-related training. Maintenance deserves the same

Maintenance deserves the same eatment, especially since most pro-ammers never study it in school. grammers never study it in school. Managers can easily recognize the value of maintenance training once they take into account that an orga-nization's programmers typically spend at least half of their time value to the company of their time

ome maintenance programmi activities are similar to those To activities are similar to those from development programming. The process of writing Cobol source code to add two numbers together, for example, is nearly the same in both. But there are enough major differences to warrant separate training

onces to warrant separate training yrograms.

The scope of maintenance work exceeds that of development work because maintenance programmers need to understand the effects their rk will have on an entire applica tion system. Development progra

ta for ma nce work are greater as well. hereas the development progra r need only see that his code

dures to fail.

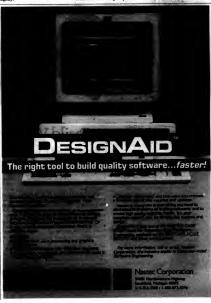
Data integrity concerns weigh heavily on the maintenance programmer, who needs to consider the overall impact of each change he implements. Such concerns affect the development programmer only

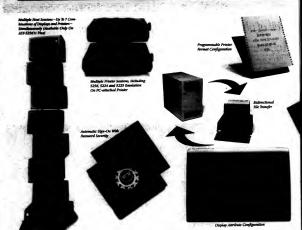
ware, but maintenance programm must introduce software changes without changing the way users work — unless, of course, users a trying to make changes in the way

ce training can yield a

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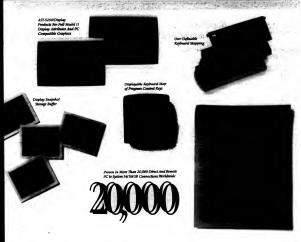
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Specialized software maintenance procedures

Software maintenance is on its way to prospering as an accepted subindustry, such like suito repair. And just on car owners need to understand a little bit about tune-ups and oil changes so they can request them when necessary, data processing managers need to gain some familiarity with specialized maintenance procedures no thew can administrative with specialized maintenance procedures no thew can administrative with the second sec

o perect repairs, which equate in formal requirements or design costs. • Conversions, which entail sub-stantial costs for recoding programs and retraining programmers. • Package modifications, which can either reduce costs or bring on

es too heavy to bear.

 Automated restorations, which carry an up-front cost but can subsently save a great deal of mainte-

Managers should take some time to understand the substance and im-

ions of each. Enhancements entail the addition of new functions to existing soft-ware, either to meet users' evolving needs or to provide additional usef

Enhancements continue without end for as long as a program remains in use. They cost the data processing shop little money because they are either funded by users or are devel-oped to add value to software. Enents continue without hancements typically proceed ac-cording to the same methods as new

velopment: requirements defini in, specification writing, a revie on, specification writing, a review ocess, walk-throughs and so forth. Defect repairs, as the name cleardicates, are efforts to fix bugs in

software. Three factors dist First, the largest volume of defect repair work is usually concentrated

in the first year of production, al-though low levels of repair tend to continue indefinitely.

continue indefinitely.

Second, the development group typically funds defect repairs, charging users only in special cases.

Third, defect repairs often proceed with haste and follow no set structure, especially during an emergence.

Managers should note that less

than 5% of a program's modules com-monly contain more than half of all its bugs. If a shop can isolate and eliminate these problem modules, it can reduce its defect-repair burden

enormously.

Conversions from one vendor or one host environment to another call for substantial modifications of a company's production software.

Such large-scale projects can prove very difficult and cause a lot of stress. But they can also give a com-

my the opportunity to replace ag-g, unstructured and high-entropy stems with new and modern soft-

Barriers prevent

tools' acceptance

ns that

ès are not easy lem-solving intelligency rt for such activities.

Until recently, there were only two ways to deal with the patched-up, hand-me-down, unstructured COBOL programs that consume up to 70 percent of your company's software effort.

You could continue to live with the old programs, patching and mending as best you could. Or you could scrap the programs, at enormous cost and disruption, in favor of an entirely new system.

But now there is a third alternative. COBOL structuring. The advantages of this alternative are enormous. Among them, the ability to reduce maintenance costs by 50 percent by more effectively using your programming resources. The technological leader in COBOL structuring is Language Technology,

Inc. In fact, of the very few companies who claim to have a COBOL structuring solution at all, Language Technology is the only one with a system, called RECODER," that is fully automatic. The others automate

only a portion of the structuring task, leaving the really tough parts to be done manually, over a period of weeks or more, by trained experts, who, because they are human, will make mistakes.

Based on proprietary language processing techniques and pioneering research in graph theory, RECODER has reduced the tremendously complex mathematics involved to a provably correct solu-

tion so complete that it does not force you to accept its own style of structured code. You can select the level of nesting, type of operators, complexity of expressions, formatting style, representation of procedures, and many other features that might be required by your own in-house standards.

RECODER, available as a service or by license, can automatically structure thousands of lines of COBOL in minutes, without the necessity of adding

Executive Report So

nance programmers need take a great deal of time for vendors to

ot one of the three problems indicates a lack of good will on anyone's part. No programmer would choose to ignore a tool that could obviously help him; no compa-ny would sabotage a chance to im-prove its productivity; no tool ven-dor would willingly restrict its sales. The barriers to acceptance stand

because no one can show hard evi dence that tools actually help programmers and improve productivity. Until the industry backs a serious investigation of specific tools' true value and cost, users will shy away vertheless, the field of software maintenance tools will contigrowing gradually, especially on merit of an intuitive feeling that automated tools must do some go

said certainly use some help.

Since most maintenance program
ers spend more than half their tim mers spend more than half their tim looking at listings and screens and talking to each other — visible sign of an effort to understand the change requests on which they are working and the system on which the changes must be accomplished — most software maintenance tools tax

Tools that interpret code are lown as static analyzers. They in-Tools that interpret execution are re and find or modify i

values, are a good example. Other tools go a step further. Rather than interpreting code, the control and change it. Examples in

de configuration managers, which p keep track of a system's components, and renewal tools, which si plify or standardise unwieldy code Flowcharters, configuration ma today's most dynamic ma

or tool categories:

• Flowcharters and related data-flow display tools are attracting no-tice as technicians refine the meth-ods that provide maintenance

we change this value here?"

• Configuration managers, which have been mandatory for military

contractors, are currently penetra ing business application shops. • Renewal tools are gaining momentum in business organizations a vendors come up with new ways to reduce clutter in software code. Commercial collections of tools,

own generi programming environments, are also attracting a great deal of attention as k ways to package tools

Tool options now available

rogramming organizations in search of software mainmance tools should be aware of se options available to them.

Right now, ven Right now, vendors market 20 dff-ferent types of maintenance tools:

1. Tools that keep track of a system's parts. These include con-figuration managers, library-con-trol systems.

2. Tools that keep track of pro-ects and provide activity reports.

3. Source code formatters, also

Source code formatters, also known as beautifiers.
 4. Tools that compare historical versions of source code to identify differences and track changes.
 5. Cross-referencing tools, which create an index of control flow and data flow within a pro-

6. Data flow displays, also known as flowcharters, which in terpret and follow a system's con

7. System synthesizers like the Unix tool Make. 8. Tools that generate data with

nance programmers which mainte can run tests. 9. Test drivers, which allow

programmers to set up a sequence of test activities then run the ac-tivities automatically.

tivities automatically.

10. Interactive debuggers, which let programmers step through a program to find or modify internal values.

Tools that interpret the

probable causes behind abends.

12. Coverage analyzers, which identify the parts of a program used during execution.

13. Tools that analyze system

ning and performance.

14. Tools such as run-book gen erators that provide operations

15. Execution scheduling too which ensure that a sequence of events runs in proper order. 16. Documenting and annotat-

ing tools.

17. Tools for restructuring, ret

rofitting or renewing code.

18. Translation and conversion 19. Probes that allow mainte

nance programmers to look into a firm's data and see what is there. 20. Maintenance programmin environments, which package collection of maintenance tools

— Nicholas Zyegim

consultants or any new people to your staff or of requiring any new skills of the people already on it. And, RECODER can do it with a cost effectiveness that will allow it to pay for itself within a year. Because you hear a lot of promises from a lot of software companies,

we can understand if you are skeptical about what we say we can do. That's why we want you to know that RECODER has been cutting its teeth on real world COBOL for four years now, successfully structuring millions of lines for such forward-looking companies as Federal Express,

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27 Congress Street, Salem, MA 01970.

THE LEADER IN REDUCING SOFTWARE MAINTEN

tered from page 62 e — a boon to the mai

Either way, conversions cost a lot money, for two reasons. First, in est cases, a large portion of the

most cases, a large portion of the existing grouterion software re-quires recoding. Second, program-mers need training to learn the new system's operations. Package modifications entail making changes to a commercial software package in order to fit the the software package in the software the software software the software the head of the software n adds additional functions to ful-

then adds additional functions to rui-fill the remaining needs. Such modifications allow compa-nies to acquire custom-tailored appli-cations for puch lower costs and in a shorter time than they might need for custom development. But pack-age modifications backfire unless the vendor agrees to make the changes

or to provide support for additions the user firm makes on its own.

If the vendor refuses to support the modified software, its decision the modified software, its occision can leave the user company stranded with nowhere to turn for future soft-ware support. This outcome is, over the long run, one of the most costly a DP shop can bring on itself.

Automated restorations, the newest form of maintenance, deal with the oldest software. They follow a process whereby maintenance professionals use automated tools to convert aging, unstructured and high-entropy software systems into

highly structured modern systems.

After restoration takes place, pro

grammers can make subsequent up-dates with relative ease. Besides reducing entropy and structural complexity, which lightens a compa ny's maintenance burden, the pro-cess provides new documentation for the restored software, which facili-

tates future maintenance effort As a process, restoration is not new. Companies always held the op-tion to streamline their code manual-ly if they so chose. But manual resto-

med so much time and cost so much money that companies often found it quicker and cheaper to scrap their old software and de tirely new versions

The current interest in restoration developed after the appearance of technology that automated the proess, thereby reducing time and expense. Automated restoration tools which build upon recent advances in graph theory, thoroughly analyze unstructured programs and auto ically restructure them without

much human intervention Restructured programs typically run 10% to 15% larger than their originals, and many professionals feel that restructured code performs poorly. But in cases where an original application included a large con-centration of dead code, the restructured version can actually be tighter. And in cases where the applicafailed regularly, the restructured code can outperform the original merely by reducing the number of outages and reruns.







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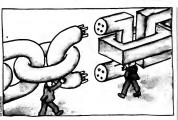
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High user overhead mars interface design

Software products that force end users to spend too much time and work too hard just making their way through the programs — instead of performing useful work ultimately fail. Interfaces like these use the users.



By NEAL MARGOLIS

omputer users perform two kinds of task: tasks that involve direct interaction with a software program and tasks that help them to make their way through a program. The former are critical, utility tasks; the latter are overhead tasks — not directly related to making the program perform its functions.

A poorly designed user interface causes users to perform too many overhead tasks — searching for the meanings of words, following inactive prompts, waiting for feedback. Interfaces such as these use the users.

One expects overhead costs to be greater when a user is learning. A new product usually brings a new conceptual frame and vocabulary to a problem. However, when a product ignores certain basic rules for communicating, learning turns into frustration as the user ends up searching for meanings and backing out of blind alleys. Prod-

Margolis is the director of Skillware Development, a Palo Alto, Calif., firm specializing in helping people relate to computers and computer products through user interface design, training and documentation. ucts like these sustain a high overhead and ultimately do not last long. By contrast, thoughtful interface de-

sign and evaluation reduce user overhead. Moreover, software producers sell more and pay less for support when they systematically attend to

- opportunities to reduce this overhead.

 The following factors contribute to high user overhead:
- Poor or missing feedback.
 Inactive prompts.
 - Inactive prompts.
 Misdirection.
- Unprompted functions.
 Functional duplicity.
- Unnecessary user duplication.
 As in running a business, some overhead expenses will always exist. The following interface evolution guide-
- lines aim to minimize these expenses.

In polite conversation, we generally expect a sort of quid pro quo. When we put something into the conversation, we expect something back. If nothing else, a program should be polite and let the user know it is listening.

Example: In a 35mm slide creation program, text manipulation is handled in two modes — entry and edit a dubious tactic in itself. However, when users press the F2 key to enter the edit mode, the program gives no



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Software designers often do not reflect a broad software using soften as not repeted about enough view of prompting. They should understand that everything on the screen competes with everything else for the user's attention. The more time users spend paying attention to road

signs for which there are no roads, the greater the user overhead.

sign that a new mode is in effect. No "edit" indicator appears, no beep nothing.

Appropriate feedback can be giv-en to users by displaying an edit ode indicator or by changing the shape of the cursor to indicate a change in edit mode. For example, a full-block cursor might signify nor mai field entry and a half block might mean edit rewrite, while an overscore might indicate edit insert.
Some feedback problems arise be-

cause the software is developed on one system and used on another. For example, when a program optimized for a floppy-disk system is used with a hard disk, the new-found speed can cause its own problems

Example: In one word proce sers must clear a work space before erting a new document. On a floppy system, the message "work space cleared" is displayed during a rela tively slow floppy disk access so us-ers have plenty of time to read it. But when the program is used with a hard disk, the message whizzes by

In general, programs should not control a user's reading speed or pre-dict how long the user takes to absorb a message. For messages that warn of the possible destruction of information, the program should let users decide when they are finished reading the message.

Software designers often do not

reflect a broad enough view of prompting. They should understand that everything on the screen com petes with everything else for the user's attention. The more time users must spend paying attention to road signs for which there are no roads. the greater the user overhead.

Many inactive prompts result when a screen is updated to reflect a mode change without clearing previ-

ous information.

Example: In one text processor.

an "F9 to preview" prompt is displayed on the status line with the ement to let users know that if they press the F9 key, they will see their document as it will be printed

However, when users leave the document screen and return to a higher level menu, the "F9 to pre view" prompt remains, even thou in the new menu mode the prompt is not active. Press as the user will, the promise of a preview is not fulfilled.

If you watch users responding to such a situation, you will see that they act as though they were tricked or lied to. In general, computer pro-grams should not be deceitful.

e messages seem to steer users away from the most important is-

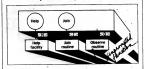
Example: In one graphics proram, the user's drawing exists in a metaphorical "drawing area which must be crased to start a new drawing. A user who selects the option "create new drawing" is imme diately confronted with the message "drawing area erased."

We can propose many improve-ments to this scheme, but the simplest would be to modify the "create new drawing" prompt to read "erase drawing area" or something similar. This way, users are informed of all the direct consequences - not just

the implied ones Some products hide this function ality from users, perhaps to reduce the amount of information new users must absorb. However, when basic functions are available but unprompted, user stress and overhead go up, not down.

Example: A popular electronic conferencing facility asks you to

An example of an unprompted function



rencing facility offers pror ver that they have a third option, that

enter "J" to foin a conference or "H" to get help. "J" signs you on and committe certain system resources to managing your participation. Systems cognoscent know that "O" lets you participate as an observer, committing only intrinsal system resources. However, other user recicies no prompt for the "O" rest recicies no prompt for the "O".

Users can find information on the missing "O" prompt in the product docu-mentation. However,

emphasize the to emphasize the product's irresponsi-bility. It also shows that using documen-tation as a patch for a poor user interface job is not an effective way to communicate.

Imagine your city is divided into half a dozen zones and that the rules for driving differ depending on which zone you are in.

Whoops, you just crossed Broadway, so all south going streets are now one-loag... Uh oh, here's a cop — you're east of the highway so you shouldn't have made that left turn on a red light. Too bad.

Functional duplicity occurs whe a product gives you different out-comes for the same action. If you have ever discovered that the Esci

ly feature.

Products in which the user inter-face has many states or modes are inherently more duplicitous and in-cur much higher overhead costs than those that are nonmodal.

example: One of the most popular home finance grow plays an im t role in oper une role in operat-ing the program. The key's function varies depending on which part of the program you are using and what you are doing.

The major uses of the Enter key in-

· Activating a menu option you have selected.

Stepping through a set of values that apply to a menu option so you

clude the following:

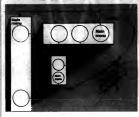
can select the one you want.

• Signaling that you have finished typing a name, a description or an

 Displaying the next page of a Displaying ten next page or a report on your screen.
 Functionally duplicitous interfaces such as this one are more cost; by because users must learn to index the contexts in which a particular context in the context

Provides access to UNIX System V and allows true integration of the MS-DOS and UNIX operating system

Functional duplicity: one action, two response





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as learn the action-result re lationship for each context. In simpler, less costly in-terfaces, the user actions and program results are

mapped one-on-one; users are required only to learn which resuit goes with hich action.

The chart at the right shows an analysis of possi-ble user screen control tasks for an IBM Personal Computer XT in which the scre controls are not consistent from mode to mode. The great variety of screen con trol variations will increase user overhead.

cessary user translatio Some prompts and mes sages are unclear because they force users to take ex tra translation steps. Time to translate is part of the time it takes to figure out what to

- pure overhead time Many parameter values given as numbers or words would be easier to comprehend if they were displayed

graphically. For example, in one graphics program, the user selects a color by choosing a

		-		(=1414)
Key	Mode 1	Mode 2	Mode 3	Mode 4
Up/On Arrow	Stoves through furnish Gimenston Spress changles as boundaries No roll			projection directions (threat
Lft/Rt Arrow	Moves through horizontal and vertical dimension within segment Does not cross screen boundaries	Disabled .	Disabled	Disabled
PgCh PgCh	Moves to http://potitions. of next/previous surem No ref	A No. of the Control	*******	· Marrier to top/collinet of streets
Home End	Moves to top/bottom of screen	 Moves to top/bottom of first/lest screen in sequence 	Disabled	Moves to top/bottom of screen

number that stands for the color. Cognitive scientists will disagree on how many extra steps the user must take in this case but none will disagree that the extra It is better to have the

user choose the color itself, or at least the color name. In this same way, the values of many parameters should be as graphic as pos-sible. The users should choose actual patterns rather than "Pat-1, Pat-2"; actu-

al symbols rather than "Sym-1, Sym-2"; actual line types rather than "Type-1,

type-2"; and so on.
The more time users spen translating the interface stimuli into performable actions, the higher the user overhead cost.

Problems in the user inter-

even a casual user will spot a specific unclear message or bothersome inconsistency. So it may seem odd that many of the anomalies go un touched by software testers

One apparent reason is that some interfaces just grow. Screen design and user control features are not specified fully at the product's

interface design phase. therefore in any particular circumstance there may be no agreed-upon answer to the question, What does the

user see or do at a time like dards are laid out, the com plexity of the product leaves no easy way to check sys-

tematically to see if the stan dands were followed Another reason that user interface bugs go undetected is that when software is tested more often than not it is tested against a specification

of program performance, not user performance. The growing complexities

of software products con-found the problem. When a product employs hundreds of screens at a variety of hier-

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commands is also required CAB Product Support Buginser You'll support strategic design cereers and other customers usin GE tools and third party software and assist them with any poblion You must have a BSEZ-PSCS and one year's experience in software designment for extractions in

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user action to move from place to place, programmers find it difficult to see everything at once. Programmers need a way of mapping the interface to uncover the blind alleys and inconsistencies. Interface mapping reviews the

user interface by creating a more or less complete diagram of the program. Unlike a machine-oriented flow chart, which emphasizes software and hardware controls and contingencies, the interface map focuses on user prompting and user control features.

77

Software testers, tirelessly documenting what happened to make the system hang up, may not see that a bug in the user interface equals a bug in the program.

In technical terms, what is mapped are the stimulus and response characteristics of the relationship between the user and the program.

program.

The key point of interface mapping is that when prompting and user control features are mapped, their anomalies come to light. Moreover, the map itself plays a critical role in communicating problems and solutions to software engineering.

Change of focus

When all is said and done, the problem of user overhead may stem from too narrow a view of the term "bug." Software testers, tirelessly documenting what happened to make the system hang up, may not see that a bug in the user interface

equals a big in the program.

When the focus is on the performance of the product rather than the performance of the users, nobody sees the opportunities for decreasing user overhead.

software producers who take the view that software is for people and that the test of a bug-free application is a successful relationship with a real-world user will produce a lot more low-overhead products and will stand to achieve a lot more success in the marketplace.

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Haste makes wasted space

A tale of data center design gone awry



Building a new data center means drawing up plans that eventually become concrete, steel, cables and very expensive computer equipment. The team members assembled for such a project must bring all their management skills to bear or risk disaster.

By ROBERT HALPER

he fable of Murphy Engineering, Inc., a compendium of many discrete incidents and projects I and my associates have witnessed, begins in the Midwest. Murphy Engineering, a worldwide leader in the petroleum engineering ness, had rapidly outgrown its existing facilities in downtown Chicago.

The company grew significantly during the late 1970s because of the global search for new energy sources. ersonnel within the company were scattered in no less than nine different locations in the city.

Communications between offices nd departments was ineffective and in many cases nonexistent. Duplication in office support personnel, such as receptionists, and in equipment, such

as telephone switchboards, telex services, word processing, mail services and reference libraries, was increasing rhead costs

Unused office space in one location could not easily be used by expanding groups in other locations. The data processing department was severely taxing existing hardware in providing data communications services between the various offices. And perhaps most important, Murphy's clients were bewhat seemed to be nine divergent engi-

neering companies.

Finally top management, concerned with the fragmentation inside the organization, the trend toward autonomy within several groups and the ever-increasing complaints from cli-ents, decided to bring together under one roof all sections of the company. A study was commissioned, and it determined that none of the nine locations occupied could support the entire staff and operation of the company.

The study turned to finding a new site for the company. The company selected a location in a western suburb of Chicago. Hotel and restaurant ac-

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commodations were convenient for out-of-town guests and clients. Proximity to O'Hare Airport simplified traveling arrangements, and the surrounding communities offered the proper demographics for personnel and staffing consid

The land selected for the new engineering site was owned by a banking institution, the Big Bank of America, which had also outgrown its facilities and had been searching for a partne to share in the costs of developing the

Murphy Engineering and Big Bank negotiated an agreement to develop jointly the property into an office complex. Big Bank would assist in management of the financial aspects of the project. Murphy Engineering was to handle the mechanical, electrical and structural design portions of the proj ect. Several architectural and cor struction companies were retained.

The building codes in the selected

rea prohibited structures taller than 150 feet, so 10-story buildings were planned for the site. Several of the buildings would stand alone; other would be connected at the corners. The centerpiece of the complex was to be the bank building. The stand-alone structures would be available for lease to the general public, while the con-nected buildings would house Mur-

phy's operations.
Ground-breaking ceremonies kicked off the project in the spring of 1980, and occupancy of the facility was planned for the summer of 1982. Various committees and subcommittees were formed to organize, plan and direct the project.

Architects can do no wrong

The director of the data processing organization had barely graduated from high school. He had been with Murphy Engineering for 18 years and, through attrition and simply outlasting everyone else in the department had moved into the directorship. His name was Ben Plenty.

Ben's dream early in life was to be an architect, but his dream and his ambition were not in tune with one another, and he ended up in a data processing unit with an engineering company. Ben believed architects

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Surprisingly, all bids for a consultant were rejected on the basis that Murphy Engineering had the in-house expertise to handle the job. Unfortunately, none of these personnel was ever given a chance to work on the data center portion of the project.

could do no wrong and en-trusted the structural and space planning requirement

architects and his boss.
Ben's boss, Sam Change, was vice-president of fi-nance for Murphy Engineer ing. Since negotiations st ed with Big Bank of Ame ns start-Sam had been eyeing a job with the bank and did not pay much attention to the ng for Murphy's data

were held, and Sam and Ben paid little attention to data center-related activities. As a result, the computer roo portion of the data center

was located on the second floor of the bank building. There was some logic l hind this decision. Big Bank planned to use the first floor as its public area and the sixth through the 10th fl

and facilities in one building seemed to make sense. Fire-rated walls, special storage facilities and vaults, high se curity, 24-hour operations and the like were required by both organizations, so the companies decided to use one structure for both of their

Unfortunately, because of Sam's and Ben's lack of participation in the planning negative aspects to the deci-sion related to the data center design. The conduits and raceways that carried the signal cables from the com-puter room to the engineer ing building and to the other public buildings were ap-proximately 350 feet long. Their length prevented the peripherals in data control areas directly to the central

processing units.

In addition, the ceiling on the first-floor public area of the bank building was to be meant that all of the pene-trating systems from the se ond-floor area had to be de signed very early in the project. This timing did not permit adequate planning on the part of data center pernel regarding conduits through the floor. By the time the managers

By the time the managers realized the problems with the location of the engineering computer room, the project had progressed beyond the point where changes of that magnitude could be made. Besides, many of the top management at Murphy participated in the decision, and suggesting changes was no support the problems of the property o

agreed that neither of them was prepared for this proj-ect. They knew they were already behind schedule, and poor decisions were begin-ning to surface. They needed help. Since neither of their staffs had the type of talent required for this job, they interviewed several consul-tants and asked for bids to assist in the project. The bid were presented to top man-agement for analysis and ap-

Surprisingly, all bids wer represed on the basis that Murphy Engineering had the in-house expertise to handle the job. (Unfortunately, none of these personnel was ever given a chance to work on the data center portion of the project.) Sam and Ben huddled again and this tim decided to hire a full-time employee — someone w could help with the job.

Hiring expertise

Finding a qualified indi-vidual was not hard, since the economy was beginning to also into the recession of to slip into the recession of the early 1980s, and many companies were terminating expensive no



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n, having already pe ed in several largeneed in several sarge-e data center projects. name was Pelix. He was aght in as the assistant ctor of data processing immediately put in rige of the data center re-

it of un-ion project. Six went to work imme-dy, forming a team con-ng of the managers of functional area within

arta processing group, does and key personnel hin the user department x pointed out to Ben the uning was behind scheden that nd that awkward posi-ng of the data center sater room in the bank tomorpaider rooms not be bank was going to present prob-lems. Been told Febix that he was alried to "make it work" and not to dwell on reversible. Been was protecting his negligence (and ignorance) and was not going to be much he been proposed to be made to be to

Functional area managers wivewed Pelitz as no outsidering and the work of the control of the con

sisted Felix in preparing sev-eral proposals for new equip-The mainframe vendor for The mainframe vendor for Murphy Engineering was the Hummer Computer Co., which had not received any business from Murphy in more than four years. It was very interested in doing very interested in doing some business and began as-sisting Felix and preparing specifications for new main-frames. Murphy had been op-erating without a backup

erating without a backup power supply, and power equipment vendors in pu-suit of new business also be gan assisting in the project. Felix, who was a veteran computer facility planner, handled the vendors in ex-cellent fashion and fully uti-liand their efforts in develop-ing a complete data centre.

ing a complete data center equipment plan. Chipper was to replace all of the

odel processors and as-ted terminals. The new ald support so that no new software or hat no new software or user retraining would be aired during the move. After the move, software ald be upgraded on each cessor as users were re-

ocessor as users we ained. Hummer Com ould replace the exi-sity, water-cooled n

peed, air-cooled processors.

The entire user network
of terminals was to be suported by a broadband local
rea network. The broadsand system would not only
erve the conputting requirenents of Murphy Engineereng but would also service
the building management. ing but wou

building management em for the entire office ding complex. All build-sensors, security device lic address avail.

ion se

computer termi

As equipment plans for the data center unfolded, Pi lix and the architects de-signed floor plans for the equipment area of the cen-ter. With the exception of the fan room and the unin-terruptible power supply (UPS), all computer room

the second floor of the bank building. The fan room and UPS area were located on the first floor along with other building support equipment. From the second floor of the bank building, vertical conduits to each floor of the

conduits to each floor of the bank and underground con-duits to each engineering building were designed and planned. Each of the engi-neering buildings was also connected via conduits that permitted local-area network services between engineering



Ever get the feeling that the video projector is undermining your corporate image? That projecting computer data is constantly subject to the whims of chance? And impossible to achieve without the

aid of inchnical assistance? Well, you the crowd.
The fact is, this leat and most critical link in
the fact is, this leat and most critical link in
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Employ has just devised a Multican wideo protical critical link in least and the critical link in least and critical frozenical assistance or adjustments.
The key to this unit is a unspea and-ook feature
and vertical frozenical estimates on signal in, and
then look in on it. And it interfaces perfectly with
microst through mainfrances, And it hylla-compasihe with a 2-yies analogologist connector and s 9-pin
link-compasible connector and s 9-pin

The architects and construction people interpreted the terminal room as a place to terminate cables and locate patch panels and junction boxes. The end result was that the programmer terminal rooms were a mass of wires, multiplexers and conduits, prohibiting the intended use of these rooms.

cture of the designed, as

e vendors.

As bids from the var As bids from the various vendors were returned to the facility project team, they were reviewed and evaluate, orders placed and equipment implementation plans devel-oped. For the data center, all

oped. For the data center, an was going well.

Sam and Ben were impressed and pleased with Felix's performance. But their attitude changed after they attended a meeting to review bids of the building management system. All of the bids feather were compared to the statement of the bids. for the system were cor in about \$500,000 high than expected. The vendors had increased the price of their systems because of the their systems because of the broadband local-area net-work requirement. Their systems would require sig-nificant redesign to commu-nicate with broadband mo-

ms. Felix was asked to justify the additional expense with savings in other areas. But Sam's restrictions on Felix's plan to wire every office did not provide sufficient sav-ings in the data center's use of the broadband system to justify the additional \$500,000 cost for the build-ing management system. The \$500,000 expenditure

The \$500,000 expenditure in a project of this scope was not all that significant, but Murphy Engineering's marketing people were beginning to see the impact of the economic recession on the engineering industry and were advising top management of a potentially soft market. a potentially soft market. With this advisement and pressure from Mr. Murphy elf to control project ent re-

costs, top managem jected the broadban jected the broadband prop al and instructed Sam, Ben and Felix to find another so lution for the local-area network.

Cancellation of the bro Cancellation of the broad-band system put Filix in a serious bind. The under-ground conduits from the second floor of the bank building to each of the sur-rounding buildings were not sized to carry a large number of signal cables. The broad-band system allowed for sig-nals to be modulated, where each modulation in

Flarthermore, the Sony Malaincan projectors, with screen size adjustable from 7 to 200 inches, are not intelligently conceeding, our answerier promound on a professional video monitor. Sony makes a complete line of video projectors, Sony makes a complete line of video projectors. Sony makes a complete line of video projectors for those who are not routinely projecting computer data with their video images. Rose and only line of facts with their video images. Rose and only line of facts with their video projectors, or Sony's histonial video Warkshops, were the Sony his Sony of the Warkshops, were the Sony his Sony of the Warkshops, were the Sony his Sony of the Warkshops, were the Son his Sony of the Warkshops, which has been supported video projectors, or Sony's histonial song the Sony of the Sony o



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togener by the proverbear training wire. Companies who recognized the need to respond quickly to changes within the business environment have been seeking a coherent information system strategy that wall help them to accreed in today's highly competitive word. That's why so many companies are relating or Cultimate three-level integration—that timing solder and of the information assources of an organization and makes accurate information existence to sentor management, cellvering on the promise of computers, making information assistate in the object companies according an according to the promise of computers, making information assistate in the object companies according.

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of devices to be supp

agineering as he By the summer of 1981, a worldwide economic re-nsion of the 1980s began king its toll on Murphy En-seering, and decisions sim-r to the broadband system UPS system was m, and the maintenance pass provision was elimi-ted. This would force the ta center and all other us-s of the system to shut wn operations while maince was performed on

the UPS. Murphy was also begin-ning to reduce staff and change plans regarding the location of personnel within the engineering complex. With each change in person-nel location, Felix had to adjust the routing plan for sig-nal cables. The cable planning effort became a

In July 1981, Sam Cha finally got his job at Big Bank of America. Sam was replaced by the assistant controller, Jack B. Nimble. nstroller, Jack B. Nimble, buck, as he preferred to be thed, was a young, well-bucated certified public ac-untant, had a good back-round in data processing saving minored in computer ience) and disagreed with any of Sam's ideas — or hat beared in the same of the same lack thereof — regarding the data center. Chuck believed the entire engineering pro-fession would be dominated by computers by the 1990s and instructed Felix to bring puting capabilities to every employee in the compa-ny. "More cables" was just what Felix wanted to hear.

Chuck was not comfort-able with the plan to replace the simi and mainframe com-puters. With a soft engineerng services market, this was ing services market, this was probably not a good time to increase capital expendi-tures for upgraded hard-ware. He put the hardware rders on ice in lieu of a study to examine alterna

This study put Felix in an-her bind, since he was about to firm up plans for electrical power and air-con-ditioning in the computer room. Chuck, knowing that Pelix was up to his ears in work, gave Ben the responsi-bility for the study. Ben, blity for the study. Ben, who during the past few months had been completely overshadowed by Felix's tal-ents, needed to make a big splash for himself and turned the study into a

On the morning of Sept. 3, 1981, the president of Big Bank of America informed Mr. Murphy that the bank was going to be sold to a group of Saudi Arabian investors. The investors was ed to occupy the entire bui ing, including the second

for "reasonable" expenses related to moving the data center out of the bank building. Mr. Murphy, without much choice, agreed to move the data center and informed his vice-presidents of the situation. Chuck, Felix and Ben took a long, long lunch. For Felix, this move

cant redesigning the com-iter room and necessary ilding facilities from ratch. The floors in Mur-

ter room would have to be ncy power generator ngineering building emergency power generat in the engineering buildin was not adequate to support the data center operation. An additional generator The security system was in-adequate and would have to be expanded to provide closed-circuit television, mo

tion detectors and access

All of the casts communications circuits that had been routed to the bank building needed to be rerouted to the engineering building. The elevators in Murphy's building was too.

ing. The elevators in Mur-phy's building were too small for some of the equip-ment. Another means of get-ting equipment into the building had to be devised. The conduits in the engi-neering buildings were de-signed and sized to handle en various engineering

All of the data co

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departments. They would not handle the entire distri-bution of cables from the computer room. Expensive fire-rated cables would have to be used throughout the

Felix went back to the Felix went back to the drawing board with the ar-chitects, engineers and con-struction companies, and by December 1981, the comput-er room had been redesigned and located in the engineer-ing building complex. Ben was still fanning the fires related to the mini and mi frame computer study, an the Chipper and Hummer computer vendors were pressing Murphy's management for a decision nt for a d

There were only eight months remaining before start of occupancy in Au-gust, and lead times for gust, and lead times for equipment orders were evap-orating. Chuck, tiring of Ben's political games, gained management's approval to order (with 60-day cancellsn options) two main-

four minicomputers from Chipper. The equipment was to be delivered and opera-tional by July 1, 1982.

With equipment planning and ordering under control Felix began focusing on pla Pelix began focusing on plaining the move and start-up of operations. The technica services group, with responsibility for the computer software, was overjoyed with the plans for new

Felix suggested no changes in operating systems, since the current level of software would function on both the existing and later model computers. He advised the manager of technical services about the risks of going into the new center with new hardware and operating system software. The manager viewed Felix's position as reflecting a

lack of confidence in his technical services group. He ignored Felix's advice and

ignored Feltix's advice and began preparations for in-stalling new actiware on the new computers. Polits also alerted the manager of appli-cations development to the risks of implementing new applications systems during the move, and in this in-stance his advice was greatly appreciated.

stance his advice was greatly appreciated. Frequent trips to the new site were becoming part of Pelix's weekly routine. There had been a great many changes in plans resulting from moving the computer room from the bank building and Felix and the vendors were tracking progress and adjusting delivery dates for equipment to coincide with construction progress.

All too often, data center data center
planners do not
enter the process
until space
planning for the
facility is
complete—
about five months
into the project.

One problem in the sched-One problem in the schedule that was beginning to surface was the UPS system. With the delay in decisions regarding the type and quantity of computers that would be installed, the sizing and ordering of the UPS was, in turn, delayed. Also, the UPS, which originally was played to be located on the which originally was planned to be located on the first floor of the bank build-ing, was now to be located in a sectioned-off area of the computer room on the second floor of the engineering

building.
Moving the computer
room meant an additional room meant an additional fan room was required in the engineering building. With space already at a premium in the equipment areas, the fan room was located on the floor that housed the programming staff. Layers upon layers of soundproofing were required to muffle the noise.

Architects and data pro-cessing people do not always speak the same language, and a mishap occurred reand a mishap occurred regarding the data center terminal rooms. These rooms were to serve as a reas where programmers and analysts could share computer terminals, thereby reducing wiring costs and the number of terminals required to service the whole organization. The architects and construction prople interpreted the terminal room as a place to terminate cobble and loo-

cate patch panels and junc-tion boxes. The end result was that the programmer terminal rooms were a mass of wires, multiplexers and



in Depth/Data Center Design

May 1982 approache

During the last week in

April, management decided to cancel all but two of all new mainframes and scomputers. The equip it at Murphy's existing new computers. A two-phas move was planned: The new computers would be in-

and support operations,
while existing equipment
was shot down, moved and
installed at the new site.
Fortunately, the new cor
puters, more compact than

puters, more compact the existing systems, would fit on the elevators in the engineering building. But the existing mainframe would existing mainframe would not fit on the elevators, and other accommodations and plans would have to be de-

in the computer room had to be reworked. Chilled water supplies had to be added to the com-puter room facilities. The electrical power and air-con-ditioning distribution plans had to be adjusted for the equipment that was to be moved from the existing cen ter. The computer equipmen cables in use at the existing data center were not long

multifloor configuration, and additional cables for the old or computers had to be or-

In early June, the data center was nearing comple-tion. The fire control system security system, local-area network, raised flooring and other building facilities were and arrived at the site after and arrived at the site asset the raised flooring had been installed in the computer room. It was too heavy to be lifted safely to the second r on an elevator. Sections of the outer skin of the build ing had to be removed, and the UPS was lifted by crane the computer room floor. The UPS had to be moved through the reception area of the data center, which

had a beautiful tile floor The floor was left unprotect ed and was practically de-stroyed by the weight of the UPS. The UPS room, although accessed from the computer room, did not have a raised floor. The several steps leading from the raised floor area to the UPS pad did not permit moving the UPS rough the computer room to its planned location. A section of the back wall of the computer room had to b

oved to install the UPS Move in and start up

On June 15, the new main frame and minicomputer sys tems arrived at the data cer ter and were set in place without any mishaps. The technical service group was having difficulties with the new operating systems, and because of delays in testing cuits (Ma Bell was being reorganized by the U.S. gov-ernment at this time), did not

system in reliable working condition. The week before Chipper

Computer shipped its new minicomputer, it sent Mur-phy's veteran field enginer to po avail - and was

to no avail — and was sent a couple of trainer engineers, whom he dismissed in flavor of installing the minicomputer himself.

The problems caused by delays in late equipment arrivals, lack of communications services, inadequate field engineering personnel, technical services blunders and a variety of other mishaps prevented the data center from reaching coerations. ter from reaching operation-al status by August 1982. The move of existing equip-ment from downtown Chica-go was rescheduled for Sep-tember, when once again the skin of the building was re-moved, and equipment was crane-lifted to the computer was the skin of the skin of the skin of the skin of the proper sees. By this timroom area. By this time, well practiced and executed

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was fully operational by Oc-tober 1982.

The events that comprise his story did not all occur using the construction of a e data center. Not even apany the size of Mury Engineering would have revived this account. But ch mishap and incident did our, and in retrospect, in retrospect,

d here can be avoid

By the way, Pelix is doing fine. After the relocation, Fe-lix, Ben and Chuck had one of those long, long lunches. Pelix, tired of hearing how the three of them "made it work," resigned and now leases computer equipment ses computer equipment temporary, short-period s — at very high prices.

There are many war sto ries similar to the Murphy Engineering story that por Engineering story that por-tray the panic and mishaps ons. But in most in-

stances, the decision to relo-cate or build a new data cen-ter is a thoroughly analyzed os decision Managent is fully aware of the siness operations and ees with caution and rect regarding data cente ruptions. Although the days of frantic and panic are passed, "Murphy" still ex-ists, and careful planning is

From conception to com-pletion, a building complex

requires approximately two years to complete. This time period varies somewhat with the size of the project, but few large-scale building complexes are completed in less

This time frame suggest that from the announcem of the project to the start of occupancy, data center plan-ners have less than two years to complete their

All too often, data or ers do not enter the process until space planning for the facility is complete - about five months into the project. This is much too late in the project and does not allow sufficient time to size the various functional eas of the data center. Data center planners should be involved with the entire building plan and space plan-ning process from the begin-ning. The operation of the data center has an impact on almost every occupant, and the data center will use more building facilities than any other group of occupants.

The planning of a large

ale data center should begin with the overall site selection and architectural space planning process. This allows the maximum amount of time for completion of the data center facility.

Project team

After the decision to relo-cate, renovate or build a new data center has been reached, organizational management selects a project manager to direct the data activities. This persor should be relieved of any other duties for the dural of the project. In many inces, an organization will appoint a manager within the data processing department and not relieve this. person of his or her normal responsibilities

Managing the design, or struction and occupancy of a new data center is a full-time responsibility - at least, Or ganizations that fail to rec ognize this fact usually incur itside consulting expenses to support a "part-time project manager. The person selected to manage a data center project should have a thorough understanding of the operational aspects of the data center and good project management skills The data center project

manager should begin form ing a project team at once and identify the personne required to support the project. These personnel re-sources include individuals from the architectural firm construction company, loca telephone company, comput er equipment vendors and representatives from each functional group within the data center such as data entry, operations, technical services and data commu-

Architectural firms normally assign special person-nel to the data center sector of the project. The data center project manager must de velop close working relation ships with the architectural space planner and mecha cal, electrical and structural el. Initially, of

course, the space planning will be the most important but eventually all the disci s mentioned will need to tegrate their efforts to

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center.
Several key personnel in the construction company play a major role
in the project as construction begins.
The electrical coordinator (responsable of the materialisation of signal cables, power supplies and building
coordinators (responsable occurred systems) and the facilities
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project trasm. Of course, representatives from local telephone companies and computer vendors, need to be team members. The telephone companies canot respond as quickly as they could prior to the Bell system breakup and need as much lead time as possible for securing equipment. As mentioned earlier, the functional groups

tioned earlier, the functional groups within the data center should be represented on the project team. Representatives from the organization's audit and insurance staff

should participate on the data center project team. These individuals as six with security and facility protection issues and decisions. The last project team member is the administrative assistant. This person will handle hundreds of administrative tasks that would normally burden the project manager. A good candidate for this position is a young, aggressive, ambitious data

processional. The setting for the new data center may drastically influence how work on the project is carried out. If the data center is part of an office complex, then the project team will focus its activities on the confines and areas related to the data center and areas related to the data center above should suffice. That is, the responsibilities for site selection, structure design, decorating, building facilities and general offices.

be handled by an overall facility management leave mount of management leave mould participate in various facility committees but would concentrate its efforts on integrating the data center into the overall office complex. If the data center is stand-sione structure, then the data center project team would be the overall facility management team and would require a much broader member shile.

Team communications

A formal means of communicating requirements and changes to plans must be established for the team. The data center project manager about coordinate the transmitted of members. In particular, timetables and procedures for approvals and changes must be clearly defined. All inga become "frozen" before the project manager has given final approval. Bach type of document (for power specifications) will mature

brough various levels of revisions. Procedures should be established for identifying preliminary working forth saw fill a final and approved levels of documents. Use ink stamps different title blocks or logos for distinguishing the various levels of document maturity. This may appear to be an exaggerated point, but the documents the data center project team generates eventually become con-

It is vitally important that procurement and construction contractors take action on the proper level of documentation. Premature execution will cause rework and delays. Walls in the wrong places and incorrect equipment are difficult to change and become an embarrassment for the project team.

crete, steel, flooring, walls, windows and very expensive equipment. It is vitally important that procurement and construction contrac-

It is vitally important that procurement and construction contractors take action on the proper level of documentation. Premature execution will cause rework and delays. Walls in the wrong places and incorrect equipment are difficult to change and become a source of embarrassment for the project team.

After the data center project team has been identified, the next phase is to develop a project plan and schedule. Managers differ somewhat in scheduling techniques, but the one presented here is simple — and it

Attach a large piece of paper to a large wall and draw 24 vertical columns. Each column is used to define one month's activities. Categorize functional areas of the project down the left margin of the paper. Next, include the planning and design activities above each calendar quarter.

Project activity matrix

This technique is called a project activity matrix. The matrix is not intended to serve as the scheduling instrument for the project. Instead, it is to be used as a data collection mechanism through which the scope and timing of the project are defined and recorded.

The project activity matrix cells are completed as a result of meetings with the architect, structural and electrical engineers, construction coordinators, facility planners, vendors and data center personnel. As requirements are spelled out and end

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In Depth/Data Center Design

es should be posted. R s and activities should

Once a requirement is estavoished diposted, all related activities are veloped and posted in the matrix its. For example, suppose the data oter has a requirement for a UPS. ere is a sequence of activities that at be planned to achieve the int be planned to achieve are ... lation of a UPS system. This se-are includes, but is not limited to,

le following activities:

1. Define the supply duration ninutes, hours, days and so on).

2. Determine the voltage size (in

3. Develop specifications (per lance, configuration, bypasses). ance, configuration, bypasses).

4. Lay out floor plans for UPS

5. Interview vendors.

Solicit bids and select a vendor. Prepare purchase requisitions. Order and schedule a UPS sys-

(manufacturing time). 10. Inspect the system prior to

11. Receive, inspect and install

the system. 12. Test the UPS system (stand-

Test the UPS system under

actual load.
14. Develop operating procedures

for the UPS sys 15. Train personnel on UPS oper-16. Monitor and tune the UPS sys

tem performance.
Each of the above activities should be entered in the matrix in the proper time frame. Although

there are some impingements, work-ing backward from the end date and allowing sufficient time for each allowing sufficient time for each UPS-related activity will provide the basic plan and sequence for the UPS

installation.

The impingements regarding the UPS system are related to activities

numbered 2, 4, 9, 11 and 13. For example, in order to size the UPS n effectively (item 2), the com puter room equipment power re-quirements must be established,

quirements must be estabulance, which assumes that the computer system — mainframe, minicomput-ers, disks, printers and so on — ha to be planned. To lay out the floor plas, for the UPS (item 4), space planning for the facility must be completed. Vendor lead time (item 9) dictates the amount of time between ent and inspecting the tem, Before the system is re-

ceived (item 11), the UPS room must be released by construction person nel. Before actual UPS load testing (item 13) can occur, the computer

room equipment must be installed.
Posting the planning activity cells from a top-down perspective will help set the timing for related activi-ties such as the UPS and computer

All of the requirements and relat ed activities will not be known at the beginning of the project or even three or four months into the proje Requirements will change as the building complex plan unfolds and the supported business requirements change, in fact, many activities are not evident during the planning pro cess but emerge as the project plan is carried out

Project scheduling and contro it will probably take four to six weeks to develop the project activity matrix to a level of detail such that

the major project activities have been posted, sequenced and im-pinged. The project activity matrix should now be converted from a planning mechanism into a schedul ing and project control instrument. A critical-path method system should be used to schedule and control a data center project. The order of magnitude of the project, the hun dreds of activities and the inevitable changes in schedules dictate the use of such a method. Critical-nath methods provide a

planner with a computerized scheduling tool that determines the start and end dates for each activity with in a project. Using the critical-path method eliminates the need to change activity dates as the project and activity schedules change. The basic input consists of the activity description, time duration and responsibility. Related activities are linked together with codes called nodes, which identify the previous (predecessor) and next (successor) activities. For example, if Activity 1 is to start Feb. 1 and last 80 man hours (or two weeks), then Activity 2 will have a calculated start date of Feb. 15.

The critical-path method provides an automated means of revising schedules when activity deadlines are not met. Suppose Activity 1 takes 120 hours to complete instead of 80 When this activity is updated to 120 hours in the data file, the criticalpath method recalculates the start date for Activity 2 and all subse ment activities. This automatic scheduling feature will save hun dreds of hours of rescheduling work and provide an accurate schedule for all project-related activities. (Keep in mind that GIGO rules apply to criti-

cal-path planning systems.) There are many such systems available for both mainframe and personal computers. New systems are constantly being developed and made available to the general public Early in the project, the project

team should survey the software marketplace, select the critical-path method to be used and become famil method to be used and become famil-lar with the particulars of the select-ed system. The system selected should provide, at a minimum, activ-ity reports with start and end dates, milestone or key activity status re-ports, resource-leveling capabilities and graphical presentations (network diagrams) of the project activi-

Once all the planned project



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activities have been entered into the critical-path method data file, the schedule needs to be adjusted. The milestor and end dates need to be fixed, and critical paths — activity sequences with no - need to be stud

At the beginning of a project, there should be no criti-cal-path sequences. If there are such sequences, they will ore than likely go negative (in other words, activities will come in late) by the time

these sequences are execut After the network is d, various reports can be uned that provide the necessary project control in-formation. A few essential

reports should be used:

The functional area re-

 The responsibility re- Start and completion schedule reports.

The functional area report ovides the status of all project activities by functional area and provides a means of monitoring prog-ress by functional areas. The bility report lists activities according to respon sible person or group. This report should be distributed to project team members and serve as each member's "to

do" list. The start and com-

dates by month. These re-

pletion schedule reports list

activity start and completion

ports are used to ensure that activities start and finish on schedule. Both of these reports can be used for report ng project status to management — the project manager's favorite ch The critical-path method data file will not be complete

when first created but should be maintained continuously throughout the project as requirements are defined and schedules become At the beginning of the

data center project, when the primary focus is on planning. monthly meetings and status reports will suffice. As the project progresses and activity levels increase, more frequent meetings will be reired. In fact, during the final days when activities are scheduled on an hourly basis, a daily team meeting

may be required There are alternatives to the planning and scheduling techniques discussed thus far. The methods suggested

are formal and certainly require hardware and software resources, together with a degree of technical expertise. In lieu of the ac-tivity matrix, for example, a storyboard technique could be used. A large wall and calendar are still required Each activity is written on a small index-type card and attached to the wall in the proper time frame. The cards can easily be moved as the timing and scheduling of activities unfold. In place of a critical-path system, a sim ple data file on any type of computer, printed out in var-

77

Representatives from telephone companies and computer vendors need to be team members.

ious sequences (responsibil ities, functional areas, due dates and so on) is very help

Having a project plan and chedule will not necessarily get the data center constructed. In fact, the project will actually begin while the

planning and scheduling are in progress. Execution: Top-down plus

The execution of the data center project will basically follow the same series of events in the top-down planning sequence. However, there are several additional activities not sho

must be attended to As soon as possible after the decision to move or reno-vate a center has been reached and a site has been selected surveyed and nurchased or leased, an archi tectural firm and construc tion company should be selected. This is a complicat

ss and is often quite

political but should be ac complished as quickly as In many instances, several architectural and construc-tion companies are retained, and each company is asand each company is as-signed sections of the proj-ect. The architectural firms and construction companies frequently subcontract work to other companies, and these subcontractors should also be identified.

After all the participa

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been identified, a inga should be ch

sically have their own d sequences for executin and these procedures sh be shared with the data center proj-ect team. This provides the data cen-ter team with its schedule for design ing and developing area tayouts equipment specifications.

e data center team, especially the project manager, should become familiar with the local building and on codes. This will aid in developing specifications for equip

In Depth/Data Center Design

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The planning system selected should provide, at a minimum, activity reports with start and end dates, milestone or key activity status reports, resource-leveling capabilities and graphical presentations (network diagrams) of the project activities.

Once the overall size and structure of the complex have been decided, the architects will begin developing plot plans, underground systems and foundation designs. The construction company will begin excavating the area and preparing the site for con struction trailers and equipment. The data center team should begin quirements with the architects. This

is primarily a drafting or drawing process, and members of the project team should become familiar with how to present their thoughts in pictorial form

As structural and space plans nea: completion, the project team will start to focus on the data center nent requirements and the

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tated by the construction and instal lation plan. For example, in a multibuilding enviror ground conduits for both the local area network and communications systems need to be specified prior to pouring foundations and groundfloor structures, Items such as raised soring and documentation vault shelving will require specifications

In this process, both construction nd computer equipment require ents are identified through the

eparation of descriptions of the tions, mechanics, performance and capacity of each equipment iter The specifications should be deeloped in the same sequence as did

ach later in the project. varies with the type of equipment. For simple off-the-shelf items such as moderns, terminals and cables, the ecifications will probably come in

the form of a purchase order. The more complex items such as the fire control and abatement system wili require lengthy descriptions of the ons and functional characristics of the system. Next, equipment requirement and specifications should be re-

viewed and approved by manage ment, submitted for quotations to vendors and finally presented to the proper group for procurement. This specification/procurement cycle is repeated throughout the various construction phases until all equipment ems have been ordered

As equipment arrives at the construction site, it should be inspected and, if in acceptable condition, ap proved for installation. Members of the project team, architects and con struction personnel will be meeting frequently to review schedules changes in plans and equipment and of course, problems. The data center project team should pay particular ention to any changes in structur al features that have an impact on

components of the data center Several months before the comple on of the project, several members of the data center project team should move to the new site, assist in the inspection and checkout of ent, inspect structural aspects of the data center and begin preparations for the move in and start-up of the center

The data center construction and riated equipment costs will be large enough to attract the attention of top management. The data center project manager will be required to develop and defend the data center budget. Construction costs will be dictated by the overall building costs, which can be calculated in dollars per square foot. The architectural and construction companies will establish this rate after the site, size and various building structural parameters have been establish Equipment will be the second major ingredient in the budget

Inquiries to appropriate vendors should provide preliminary budgeting data. After purchase orders have been issued, the budget should be revised with actual equipment costs There are at least a thousand tasks to be completed by at least a

score of people. Clear, concise, accu-rate information communicated in a timely manner to the proper people uld be the goal of the project

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Addison-Wesley Publishing Co.'s Edu-cational Media Systems Division of Read-ing, Mass., has announced enhancements

to its Microtex personal typesetting soft-

Microtex allows users to produce typeset documents on various output devices such as laser printers and phototypesetrs as well as on dot matrix printers. Version 1.5A1 is said to be more com pact so that it runs on dual-diskette-drive mputers without hard disks. It is also said to load, operate and produce typeset output faster than previous ver-

mic memory allocation allows Mi crotex to run larger and more complex files than before. It can also run Bibtex, a utili-

ty for automatically producing reference lists and bibliographies for documents. Automatic features of Microtex include kerning, ligature usage, hyphenation, page layout, mathematical and foreign language symbols, tabular alignment, footnotes, floating figure insertion and generation of indexes, bibliographies and tables of con-

Microtex was designed for the IBM Per-sonal Computer and compatibles with at least 512K bytes of random-access memo-

It works with most word proce r packages that produce standard AS-CII files such as Microsoft Corp.'s Word, Micropro International Corp.'s Wordstar or Ashton Tate's Multi

or Aston-Tate's automate.

Microtex Version 1.5A1 costs \$295. It is
available bundled with an Epson America.
Inc./IBM Graphics Printer Driver for \$369; d with Textset's Adobe Systems, Inc.'s Postscript driver for the Apple Com-puter. Inc. Laserwriter and other Postscript devices, it costs \$495. Users of Version 1.4A1 can upgrade for \$50.

Addison-Wesley has also introduced

Tex Preview, a program designed to enable a computer screen before printing Tex Preview costs \$250.

Typesetting Banyan upgrades Vines virtual networking software

Banyan Systems, Inc. of Westboro, Mass., has upgraded its Vines virtual networking software to include support for IBM PC-DOS or Microsoft Corp. MS-

DOS 3.1 and IBM's Netblos.

Release 1.3 also includes design tool that allow programmers to develop per sonal computer-based network applica-tions; diagnostics that operate locally or remotely for system hardware, network

media and serial communications; support for Ungermann-Bass. Inc.'s baseband, broadband Net/One local-area network

and for interactive Systems/3M's broad d local area network

The complete set of DOS 3.1 function calls, including record locking and default-file locking, are supported. According to vendor, moltiuser applications de-ed to run on DOS 3.1 will run unmodithe vendor, molt fied on the Banyan network. Vines Release 1.3 includes a shared compatibility mode. said to allow pre-DOS 3.1 programs to perform as originally intended

Vines' Netbios emulator is said to allow distributed applications, such as Informa-tion Builders, Inc. 's PC/Focus, to rue on a single logal-area networks or over multiple internetworked local-area networks on the

ternetworked local-area networks on the anyan virtual network.

Other features of Release 1.3 include in-remental system backing and recovery; onligurable 25th line display; and in-roved print spooling, forms support, rint queue management and printer ac-rint queue management and printer ac-

The base price for a Banyan virtual net-work is \$15,560, including a network serv-er with a 32-bit CPU, 70M-byte disk, 1Mbyte memory, local-area netwo

full system battery backup, 60M-byte tape drive and all Vines software. To aid programmers in the design and implementation of distributed applica-tions, two documents are available from Banyan: the Vines Architecture Definition, for \$25, and the Vines Program

NEC introduces APC IV micro

NEC Information Systems, Inc. of NEL Information systems, sid. of Box-boro, Mass., has amounted the IBM Per-sonal Computer AT-compatible Advanced Personal Computer IV (APC IV).

The base APC IV system includes a processing unit with a 1.2M-byte floppy disk

drive, a 40M-byte hard disk drive and a keyboard. It costs \$5,045 The standard system features an Intel

Corp. 80286 24- or 26-bit microprocessor with switch-selectable 6-MHz or 8-MHz sing speeds. It comes standard with 640K bytes of random-access memora

(RAM), expandable to 10.5M bytes, and five internal storage device slots. The APC IV also comes with two RS-232C serial ports and a parallel port on the mother-There are two high-re

oitors offered for the APC IV. The Advanced Color Display supports 800- by 560-pixel resolution and automatically adjusta to horizontal frequencies of 16.75 kHz to 35 kHz. It supports most personal computer-compatible graphics boards, including IBM 8 Enhanced Graphics Adapter (EGA) and Color Graphics Adapter (EGA) and Color Graphics Adapter (CGA). The NEC Power Graphics Display monitor offers 1,120- by 750-pixel resolution and adiasts for bustnessed.

and adjusts to horizontal frequencies of 15.5 MHz to 47 MHz. In addition, NEC Information Systems is

offering three graphics board options with the APC IV: the Color Graphics Beard, compatible with the IBM CGA and offering 640- by 200-pixel resolution; the Ad vanced Graphics Board, providing 640- by 350-sixel resolution, 256K bytes of video PAM and IBM EGA compatibility: and the Power Graphics Board, offering 1,120- by 750-pixel resolution and 16 col ors from a palette of 4.096 and the ability to connect internally with the Advanced Graphics

Western Union mail manager version supports asynchronous X.PC protocol

Responding to the increasing use of personal computers to transmit sensitive files at high speeds, West-ern Union of Upper Saddle River, N.J., has announced a version of In-stant Mail Manager (IMM) that supports X.PC, an asynchro

of the synchronous CCITT X.25 er-ror-checking protocol.

In addition. Western Union announced it will be implementing X.PC in its own packet transport network, PTN-1, in the third quarter of this

Developed specifically to interface with Easylink from Kensington Microware Ltd. of New York, IMM integrates word processing, address list, file maintenance and communi-

The new version of IMM, tenta-tively priced at \$185 and scheduled to be available in June, provides automatic end-to-end error tion in data transmissions for users of Western Union's Easylink electronic mail and information service

Current IMM users may upgrade to the X.PC version Users can access Easylink through the Tymnet network for transmis-sions using X.PC or, in major U.S. cites, through PTN-1 when it is avail-

The original version of IMM and the X.PC version can be used with an 1RM Personal Computer, PC XT, AT or compatible.

HP unveils tape subsystem Features autochanger

mechanism for backup

Hewlett-Packard Co. of Palo Alto. Callf., announced the HP 35401A 14in. cartridge autochanger tape aub-system for unattended backup. It has a capacity of up to 536M bytes. The HP 35401A combines th

jor components of the HP 9144A tape drive with an autochanger mecha-It automates cartridge loading as well as unloading and allows the tape drive to use up to eight cartridges

from a removable magazine. It is suit able for HP 3000 and HP 9000 system Since the HP 35401A performs un-

attended backop to 536M bytes, it allows system backup to be scheduled

at night without an operator. Because cartridge changing does not require an operator, the HP 35401A can be used for applications such as software duplication. In ap-

plications where access times are not critical, data can be stored on-line According to a company spokes-man, the HP-35401A is fully media compatible with the HP 9144A and

HP's range of integrated-cartridge tape and disk drives. The HP 35401 A Valin cartridge au tochanger tape subsystem can be used as a stand-alone unit or inte-

rated with a computer system into HP's Design Plus cabinet It is priced at \$7,000, according to

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NEC PRINTERS THEY ONLY STOP WHEN YOU WANT THEM TO.



EW PRODUCTS/SOFTWARE & SERVICES

es Curp. h TP is an less minter a re

ns and supports up to 37 one course to collections terminals. The http:calculates elapsed times labor reporting, prevents double cloims and clock-outs, edits for in type befare data is sent to the et and dates and time-stamps

nects depend on system configu-n. They start at \$43,000, mputer identics, 5 Si-Canton, Mass.

BGS Systems, Inc. has announce st/l-MVS, Capture/MVS an le/Base-MVS, the three compo is in its capacity management tem for MVS/SP and MVS/XA op-

ating environments.

Rest/1-MVS allows users to identi

fy and predict capacity performs problems. It features a full scr IBM ISPF interface. are/MVS provides analy

resource management facility and systems management facility date itoring current system per-

Info/Base-MVS provides access to current and historic performance

The MVS capacity management system is priced at \$40,000. BGS Systems, One University Of-fice Park, Waltham, Mass. 02254.

Lilly Consulting/System Services, Inc. has announced its Information Management System (LCSS/BMS) for Digital Equipment Corp.'s PDF-11 and VAX-11 computers tinder RSX-11M, RSTS/E and VMS oper-

ating systems.

LCSS/IMS is a menu-driven, multiuser system said to feature such systems as data entry, list processing transaction processing, member-ship management and filing. LCSS/IMS is priced at about

\$4,500 Lilly Consulting/System Services, 7259 W. Marine Drive, Milwaukee,

Wis. 53223.

Kolinar Corp. has introduced SQL/Meau, a VM/CMS product for users of IBM's SQL/DS.

SQL/Menu is said to allow users to create full screen SQL/DS applications for data or information centers. The applications allow users to que-ry, insert, delete and update data in SQL/DS tables

SQL/Menu also provides the abili ty to create user exits to inspect, alter and reject data before it is displayed or after it is modified. A full screen browse facility permits displaying data base col-

SQL/Menu is available for a onetime license fee of \$2,400 and an an

Applications packages D Corp. has announced C-P4

tem for the ignat zoguspenet corp. VAL inn icrovars series computers. C-Pian is said to let mers acticular project, frack its progress and mea-are performance. It is mena drives and offers on-hine Help. Data entry potating and reporting capabilities dow users to analyze alternative inna and respond to unexpected de-

C-Pian is fully integrated with the endor's C-Cale electronic spread-

C-Plan is priced from \$2,500 to

mal license fee of \$4,806.

Kölmer, 3084 Scott Blvd., Santa 37th Circle, Kirkland, Wash. 98083.

Clara, Calif. 98084.

PCI has same

The system combines a user inter-face package with an image process-ing package. It offers compice raster display control, data base archival and inputry-capabilities and a range of correction, classification, filtering,

ransform su-anctions. It is independent of operating sys-ems and displays: Among the sys-ems supported are Digital Equi-sent Carp.'s VMS, Microsoft Corp.'s 65-DOS and Unix. Release 3 of Easi/Face is available vernkey, programma

in three forms: turnkey, prograr

ble and source. Prices start at \$10,000. PCI, Suite 202, 4800 Dufferin St. Downsview, Ont., Canada, M3H 588.

NCA Corp. has added three modtem, human

tracks salary and benefit offerings accounts and performance p . It matches qualifications, a customized benefit package leb b

thremens. The personnel module cascusation of the large and hourly payrolls for any equency of pay period, handle utomatic deposits and multiple and the large government of the large government.

IRWIN

NEW PRODUCTS/SOFTWARE & SERVICES

According to the vendor, un-management module is used to pro-cess orders, provide order and pro-information and duction impact information and track customer histories, backlogged orders and available credit.

Prices range from \$15,000 to \$33,000 3250 Jay St., Santa Clara, NCA Calif. 95054

Intel Corp. has introduced Ista a design entry package for the Intel

a design entry package for the inter Programmable Logic Development System (IPLDS). Istate is said to allow systems hardware designers using erasable programmable logic devices to devel-op a state machine design. The soft-ware supports multiple syntaxes for state definition, specification of state

transitions, inputs and outputs
A program written using lefts
comes input to the lined Program
ble Logic Software, which opt
the logic of the code, determin
best fit of the state unachine de
the erasable programmable log
vice selected, compiles the pr

the eranance products the program and produces a heafile.

The latate machine software for IPLDS costs \$500. IPLDS costs Hillsboro, Ore. 97123

Cincom System nounced that Mass eration applicatio tern, is now avail IBM's IMS/DC to me, Inc. has an design, develop-tation facilities

tar IMS application using DL/1 de coses for all internal use files. Me a applications run in the Nati 4S/DC message processing progra

MS/DC message processing program batch message processing program and parallel scheduled transactions.

Mantis for IMS costs \$125,000.

Cincom Systems, 2300 Montana Ave., Cincinnati, Ohio 45211.

ALP Systems has asmounced Pe-brase, a development environme or rule-based linguistic software.

se is said to be des ic processing and co-arsing, including na Periphrase is a for linguistic proce iguisactive parsing, including age interfaces, teaching ages and compiler development of the vendor, it can eprding to the ver

expecting to the vendor, it can sup-port development of products in such anguages as English, Prench, Ger-man, Italian and Dutch, religious as available for Unix rell Unix-based begger costs 86,000 or a mingle-user license and \$21,000 or a multiuser license. With the En-lish frost-and-cost. sh front-end option, a single-user mee costs \$12,000, and a multiuser se costs \$42,000. Introductory

prices are available.

ALP Systems, 190 W. 800 North,
Provo, Utah 84604.

son Associates, Inc. has and the Tips Allocation Module in contantion with its Pin

or another Models for use in conjunction with its Piasatrips Payroll passage, with its Piasatrips Payroll passage, for an animal management of the passage o

The System/38 Tips Allocation Module costs \$5,000. The Burroughs Tips Allocation Module costs From \$3,000 to \$5,000, depending on the system. ciates, 2021 E. Hen-

nepin Ave., Minneap 55413. olis, Languages

Lattice, Inc. has introduced the Lattice RPG II Compiler, said to be compatible with IBM System/3, Sys-tem/34 and System/36 RPG-II com-

The Lattice RPG II Compiler is said to support standard Microsoft Corp. MS-DOS files plus the standard personal computer keyboard and func-tion keys. It has ISAM files compati-ble with Ashton-Tate's Dbase III and des special ext ons for strin handling. Additional utilities such as sort, merge and source entry are also available.

Lattice, P.O. Box 3072, Glen Ellyn, DI 60138

STSC, Inc. has announced APL-Fins, a compiler for the APL pro-gramming language.
According to the vendor, the com-piler provides faster execution time.
It also makes it possible for users to write applications that previously were impractical to implement with an APL interpretament of the APL-Pins compiler operates on the APL-Pins compiler operates of the APL-Pins compiler operates.

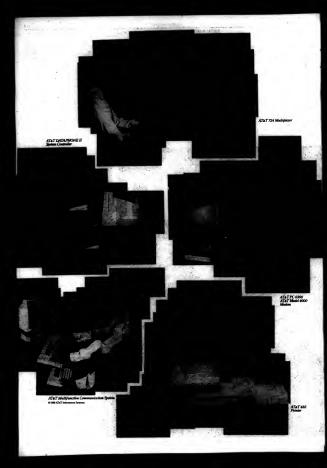
VM/SP. It is available under a one-time

perpetual license for \$30,000. STSC, 2115 E. Jefferson St., Rock-ville, Md. 20852.

Utilities

Parse, Inc. has announced Possum, a line of diagnostic products for Digital Equipment Corp.'s VAX commiters

Possum products are said to run alone, without intervention of either the operating system or the operator.



How AT&T's unrivaled strength in communications helps you build a better information network.

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NEW PRODUCTS/SOFTWARE & SERVICES

The products include diagnostics for CPU, memory diak Ethernet controllers and bsystems. They include docus m and listings.

Possum diagnostics are priced on an individual basis at \$2,500 per li-cense with a royalty of \$150. Parse, Sulte K, Coolidge Office Park, 131 Coolidge St., Hudson, Mass. 01749

Lilly Consulting/System Services, Inc. has announced Version I of Two-View, its RSTS operating sys-

tem windowing software.
Two-View is said to turn any two-page mode or scrollable CRT into a page mode or scrollable CRT into a multi-job-processing terminal. Users may switch back and forth between any two jobs. Two-View maintains screen mode and cursor positioning of the jobs being processes. Two-View is available for Digital

Equipment Corp. PDP-11 systems running RSTS/E Version 8 and higher. It costs \$550.

Lilly Consulting/System Services, Wis. 53223

The Cambridge Systems Gro has enhanced its ASM2 Automat Storage Management software said to maximize use of DASD resources in IBM MVS, MVS/XA and VS1 installa-

New features include autor intelligent transparent restore of arof critical system data, support for MVS/XA and full ISPP support for the RSVP facility. Also included is support for VSAM and non-VSAM data sets, ICF categories and mixed

ASM2 costs \$22,500 for a perpetual on-site license. The Cambridge Systems Group,

1333 Lawrence Expy., Santa Clara, Calif. 95051.

Forecross Corp. has introduced the Crosslink series of cross-compilers designed to translate programs written in fourth-generation guages and into other fourth-ge on languages

The first cross-compiler in the series translates programs written in Applied Data Research, Inc.'s Ideal fourth-generation language into IBMrd Cobel.

The Ideal-to-Cobol cros runs on any IBM mainframe system capable of supporting Ideal. It is priced at \$40,000.

Forecross, 1750 Montgomery St., San Francisco, Calif. 94111.

Redmond Technologies, Inc. has announced Secure/38, a software system designed to augment security features available on the IBM System/38

Secure/38 is said to help prevent unauthorized access to data and programs. It provides a menu-driven system for maintaining user security information, including the user's name, department, password, autho-rizations and iob information.

Other user-defined function

clude optional second-level pass-word, time limit, maximum number of attempts for sign-on from a work-station and mandatory time interval

or changing passwords. Secure/38 costs \$1,995.

Redmond Technologies, 102A Wil-n Drive, Lakeridge Park, Ashland.

Data General Corp.'s Systems Di-sion has announced SNA Suspend Manager, said to allow users to sus-pend and re-enter up to three IBM

ns, Data General's Office tion Software, CEO product and user-integrated applications. The product has five com the applications management file, the system generation process, the on-line monitor, the suspend program

and the functionality of Systems Net-work Architecture/3270, which in-cludes a suspendable 3278 program. SNA Suspend Manager runs under

SNA Suspend Manager runs under the AOS/VS operating system on products ranging from Data' Gener-al's DS family to the MV/20000. Pricing is \$4,000 for an initial li-cense on the MV/2000 or DS/7000 systems and \$8,000 per initial licen

for the MV/20000. Data General, 4400 Cor Drive, Westboro, Mass. 01580. General, 4400 Computer

Softran Corp. has announced C Tran and C-Run, tools for the appli cation software developer who sup-ports Cado Systems Corp. hardware and who would like to port the soft vare to the Unix operating system. C-Tran is a C software translation

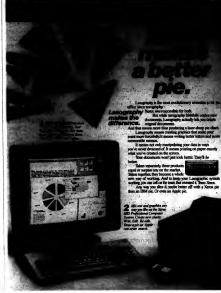
program that accepts CADOL II source-code input and generates C source code as output. C-Run is a runtime library of C programs that per-

form data base management and ternal handling functions Soften will license an execut mage of the C-Tran translation program on a per-CPU basis for \$4,000 An executable image of the C-Run library costs \$1,500 per CPU. Softran, Sulte 442, One Naperville

Plaza, Naperville, Ill. 60540. Data base

management systems

Exact Systems and Programming Corp. has announced Revision 2 of its DNA-4 data base and fourth-gen eration development system for Data General Corp. systems running und AOS/VS, AOS and RDOS.



NEW PRODUCTS/SOFTWARE & SERVICES

nment integration to simple, to internal and external sys

environment integration to simple access to internal and external system tools; and a new communication interface said to enhance special hardware devices in the system. Prices range from \$1.250 on a desktop to \$36,000 on a supermini. Exact Systems and Programming. P.O. Box 116. Thornwood, N.Y.

ftware House has announced on 117B of its System 1022

e new release is said to give personal computer users access to main-frame data as well as add wild card value matching, record locking and a System 1022 program debugger.

System 1022 DBMS runs on Digital quipment Corp. Decsystem-10 and

t supports 134 million records per ata set and features an English-like anguage, report writing, integrated rogramming language and statisti-al functions. System

\$22,500 to \$72,000, depending on system configuration.
Software House, 1000 Massachu setts Ave., Cambridge, Mass. 02138.

Training

Pinnacie Courseware, Inc. has an-ounced Introduction to MVS Sysm Commands for Operators at IS/VS MTO Commands, two con er-based training courses that run ler IBM's IIS and under PCIS and

nuthoring system.
Introduction to MVS System Commands is a 16-module course said to cover the 39 system commands feed to monitor and control MVS. BMS/VS MTO Commands is an 16-module course said to MMS/VS MMS/MS MAInfraine licenses range from \$3,400 to \$7.400 a.m.

commands for IMS/VS.
Mainframe licenses range from
\$3,400 to \$7,400, and PC versions
cost \$905.
Pinnacle Courseware, Suite 215,
841 Blossom Hill Road, San Jose,
Calif. 95123.

Cooper & Associates, Inc. has in-troduced Teletutor, a series of com-puter-based telecommunications puter-based telecommunications training courses designed for use with an IBM Personal Computer or

The courses are said to provide ersonalised training for each stem ent via text, animated color graphs, remedial branching and continu The first course in the series is T1 ansmission Basics. It costs \$299.

Cooper & Associates, P.O. Box 2286, Naperville, Bl. 60666.

Arthur Young Business Systems has introduced the Lotes Macros and Advanced Panetions computer-based training (CST) course. The course was designed for users already proficient in Lotus Development Corp. 5: 2-3 who want to learn its advanced micro, data base and the course course comes with a video-the course comes with a video-the course comes with a video-

graphic functions.

The course comes with a videotape, a comprehensive reference
guide and an IBM Personal Computex-compatible CBT disalects system
that includes tutorial exercises and
already propared macros.

The course is priced at \$490.

Arthur Young Bustness Systems,

Park Ave., New York, N.Y. 10172

Services

Scott, Foresman and Co. his announced R-base 5000 for the Programmer, a reference guide designed to show users how to build information systems with the control of the con on systems using Microrim, Inc.'s R:Base 5000.

The book offers insights, tech-niques and undocumented hints on mastering the data base software on the IBM Fersonal Computer, Personal Computer XT and AT.

It features a primer on R:Base fea tures and language elements; analy-sis, design and programming tech-niques; and short program examples. R:base 5000 for the Programmer

costs \$21.95 Scott, Foresman, 1900 E. Lak Ave., Gienview, III. 60025.

MICROCOMPUTERS

Personal Touch Corp., Informa-tion Design, Inc. and U.S. Video have introduced a touch-acress com-puter-based training system for the IBM Personal Computer. The system includes the SST au-thoring software from Information Design and Computer and Inspirity

Design, a video overlay and laserdish controller personal computer board from U.S. Video and a touch screen

from Personal Touch.
It allows users to create training ograms through the use of English

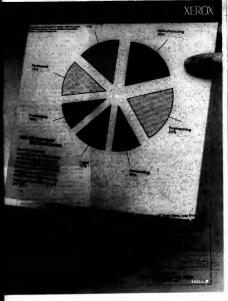
Both text and graphics frames can be designed

Images from other applications as well as from the videodisk reportedly can be be imported into the training

The system is priced at \$2,235. Personal Touch, 4320-290 Steve Creek Blvd., San Jose, Calif. 96129.

Chatsworth Computer Corp. has announced the Triple C-XT, an IBM Personal Computer XT-compatible

microcomputer.
The Triple C-XT runs IBM PC-DOS and Microsoft Corp. MS-DOS soft ware. It includes a case, 135W power Continued on page 106



SYSTEM 2000 DBMS **Drives Industry** with \$12,000 License

se Management Sy ith its \$12,000 fi

ms, performs analyses, and produce reports and retrieve data, mix formation Center users can gain access to SYSTEM 2 pri-to-use SAS memous.

To learn more about most economical data base mindustry, write or call the SYSTEM 2000 Sales Departm., Box 8000, SAS Circle, Cary, NC 27511-8000. Telept as 80205.

NEW PRODUCTS/MICROCOMPUTERS

Continued from page 106 supply, 256K-byte motherboard ex-pandable to 640K bytes, eight expan-sion slots, clock calendar with battery, parallel port, serial port, gar nort, keyboard, monochrome monit

The Triple C-XT costs \$995. Avail able options include a 10M-byte hard drive for \$425 and a 20M-byte hard

drive for \$525. Chatsworth Com witer 21626 Las sen St., Chatsworth, Calif. 91311.

Imaging Technology, Inc. has an-nounced the Series 151 image pro-cessor for the IBM Personal Comput-

The processor is a VMEbus-ba packaged subsystem. It includes f ing boards. The FB-150

Frame Buffer contains three m reases suffer contains three memo-ries for video frame storage. The ADI-150 Analog/Digital Interface in-terfaces the Series 151 to standard RS-170 and CCIR cameras and monirs. The ALU-150 Pipeline Image sor performs image processing rations such as sum on, aver ng, subtraction and convol

The RTC-150 Real-Time Convolver is an optional module that can accelerate calculation The basic Series 151 configuration

sts \$11,495. Imaging Technology, 600 W. Cum mings Park, Woburn, Mass. 01801.

applications packages

Inquiry Services has announced Leadnalysis, a program designed for managing media-generated sales inquiries, current customers and new quartes, current customers and new business prospects. The meau-driven program uses a built-in data base. Users can create, edit, update and print personalized letters, sales call reminders, follow-

up forms and telemarketing question in analysis of sales activities, prod uct interest and media costs. Leadnalysis runs on any IBM Per-sonal Computer, Personal Computer

AT. XT or compatible with 512K bytes of memory. It costs \$895. The price of \$2,000 includes on-site training and installation.

Inquiry Services, 12842 Pennridge Drive, Bridgeton, Mo. 63044.

Time Arts, Inc. has announced its Lumena Premier software program for computer generation of art. The program was designed for the

ction of refined compositions nd storyboards by graphic design ers and advertising agencies. It is also said to be suited especially to the Lumena Premier runs on the IBM Personal Computer XT, AT and com-

patibles. It is priced at \$2,495. Time Arts, P.O. Box 6476, 3436 lendocino Ave., Santa Rosa, Calif.

Mark Corp. has announced Liste Kwie, a personal computer program for the visually impaired computer

According to the vendor, Listen Kwic provides the user with full interactive control over the PC. It provides a way to define windows onto the video display that can be played back to the voice synthesizer with a back to the voice synthesizer with a single keystroke. It also provides synthesizer macros, keyboard mac-ros and applications curror routing. The program is priced at \$116 when purchased with the vendor's PC Speak or \$145 when purchased

separately.

Mark, P.O. Box 1532, Westford, Mass 01886

Control Data Corp. has added Me hanical Structures and Graphica lodeling System (GMS) to its Cy-smet Express line of microcomput-

er programs.

Mechanical Structures is so the user to create structural models





And it's simple. A single coaxial cable connects all the terminals in your office.

Which makes it as easy to move terminals as it is to change your mind about who sits where. And the cost is lunch money compared to the outrageous charge you pay to move hardwired terminals.

Now when you discover that everybody in the office bought different hardware you won't have to worry. The Codex Async LAN works with just about everything.

works with just adout every time. A year from now you'll be patting yourself on the back. Because you'll save money over any alternative LAN solution. And by then the Codex Async LAN will have paid for itself. Which will make the people in accounting think you're pretty sharp. Of course, if you decide to lease it, your cash flow position will look even healthier. Then they'll think you're agenius.

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his will only take a minute. We have a networking solution that's as simple as a Data PBX but with all the advantages of local area networking.

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TELEPHENE Send to: Codes Corporation, 20 Cabor Boulevard, Dept. 707-264, Manufald, MA 02046



The Cybernet Express pro ams run on IBM Persona imputers and compatibles. The Mechanical Structure

program is priced around \$9,000. The GMS preproces-sor costs \$4,000, and the postprocessor costs \$4,000. Control Data, 8100 34th Ave. S., Minneapolis, Minn. 55420.

Software utilities

stel Computer 5 Inc. has announ lete for IBM Perso atters, Personal (ATs, XTs and comp

Undelete is said to restore files that have been acciden-tally deleted. It automatical-ly manages disk clusters oc-cupied by deleted files so that they can be restored as

they were.

Another feature is the capability to restore selectively
the more recently deleted file
of any overlapping deleted

es. Undelete costs \$49.95.

Rintel Computer Systems, 3 Ames St., Cambridge, Mass. 02142.

Data Access Corp. has in-troduced the Dataflex Word Processor (DWP), a full-function word processing op-tion for the Dataflex Appli-

tion for the Dataflex Appli-cation Development System. The program is said to be functionally equivalent to and compatible with Micro-por International Corp.'s Wordstar and Mailmerge. It features column opera-tions and horizontal scrolling and provides users with ac-cess to the IBM extended

character set.

DWP costs \$195, the ven-

dor said Data Access, 8525 S.W. 129th Terrace, Miami, Fla.,

United Software Securi-ty, Inc. has announced Mas-tercontrol, a personal computer software product designed to facilitate the dis-tribution and management of the vendor's Privacyplus

the vendor's Privacyplus program.
Mastercontrol allows the control and flexibility to ad-minister corporatewide or sitewide use of Privacyplus.
The system administrator can restrict which commands a user can invoke, what the user's option default setting mill be as well as which setwill be as well as which set tings the user will be able to

vides a full screen disk distri-

vides a full screen disk distri-bution facility.

Privacyplus and Master-conting to the vendor.

United Software Security, 8133 Leesburg Pike, Vienna, Va. 22180

Logic Ciel has announce wik-CiCS, a personal cor

All of the CICS program code required by the main-frame is then automatically generated by Kwik-CICS.

The program can also be sed to simulate CICS creens at the personal com-CICS Kwik-CICS is priced at

provides enhancements such as the ability to retrieve any file from a list that appears on the display.

It works in conjunction with Phaser One, the ven-

dor's single pixel res

Warp Speed Comput Products, 5556 S. Inglewoo Bivd., Los Angeles, 90230.



Software

enhancements Manufacturing and Con-sulting Services, Inc. has re-leased Version 1.2 of its An-vii-1000MD personal

version 1.2 was designed to run on the Hewlett-Pack-ard Co. Vectra, Sperry Corp. IT and IBM Personal Comput-

It is said to be a 2½-dimen-onal, 32-color system that ffers users automatic calcu-It also features a range of dvanced drawing annota-

Anvil-1000MD 1.2 Anvii-1000MD 1.2 is priced at \$2,995, according to the vendor. Manufacturing and Con-sulting Services, 9500 Toledo Way, Irvine, Calif.

. r, a word proc

Data Base Manager II is a st manager that can report-

As you can see from the accompanying illustration,

keyword retrieval.
R is programmed in Ash-ton-Tate's Dbase III for IBM PC-DOS and Microsoft Corp. MS-DOS operating systems. It can run on up to 32 worksta-tions and couts \$10,000.
Assured Information Sys-

tems, P.O. Box 152, Chadds Ford, Pa. 19317.

Transportation Couldn't Get Out of First Gear.

the differential transmission wasn't the brainchild of Detroit.

No, it was more like Italy. And the engineer was none other than Leonardo Da Vinci.

Needless to say, talking differ-ential transmissions over a plate of pasta in the 15th century was not altogether fashionable and, naturally enough, was met with some skepticism.

Today, of course, the American love affair with the car is rather evi-dent. We couldn't live without it. Keeping in mind the automobil as an accepted fact of life, we'd like to introduce you to a servi that will become a standard in maintaining complex voice and data communications systems.

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ance is a new concept, to be certain, and, just like Leonardo's differential transmission, will be met with its share of skepticism That's OK. We're asking that

you keep an open mind. Communications Service nce rep single source for problem detection, diagnosis and preventive monitoring, as well as expediting restoral

of your corporate commu-nications. It helps with expansion and alteration and gives you customized services.

Communications Service Assur-ance packages the comprehen-sive solution for improving your system performance. You're able to concentrate on strategic MIS responsibilities instead of playin catch-up and reacting to the has sle, headaches and hang-ups of day-to-day problems plaguing your system.

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We're a service that will become as accepted and important as the automobile. And, yes, we'll keep you rolling in the right direction.

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PACETEL Spectrum Services

A Pacific Telesis Company

term Version 1.2, an en-hanced version of its IBM PC-DOS terminal emulator and

file transfer program.

Version 1.2 is said to allo
IBM Personal Computers as
compatibles to emulate as compatibles to emulate any type of CRT terminal. R at lows micros to access asyn-chronous ports, 3270 Syn-tems Network Architecture seasons, X.25-based public data nets and modem pools. Etherterm costs \$300 in

\$1,500 in a server versi supporting up to 20 personal

Bridge Communications, 2081 Stierlin Road, Mountain View, Calif. 94043.

COMMUNICATIONS

Software Software Research Corp

nced its Strategic Environment/File Network Environment/Pile Transfer Pacility (SNE/ PTF) network software.

Release 1.2 supports IBM VM/CMS-based mainframes, Banyan Systems, Inc.'s net-work file servers and IBM's TSO/ISPF. Improvements in

clude the end-user interface, data security package sup-port and tape file support. SNE/FTF allows users to transfer files asynchro ly between IBM MVS, Wang Laboratories, Inc. VS, Digital Equipment Corp. VAX and IBM Personal Computer-

The initial license fee is about \$22,000 per MVS host, \$11,000 per VM host; \$4,000 per mini and \$300 per miero. Software Research, One Natick Executive Park, Natick, Mass. 01760.

QUIET--

NEW PRODUCTS/COMMUNICATIONS



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Universal Software, Inc. has en-hanced its Universal Link communications package for IBM mainframes
Universal Link now provides poli
ing support for National Semiconduc

tor Corp. Datachecker/DTS point-of-sale systems with Ans-R-Tran. It supports IBM 3780 and 3660 em-ulation, allows the host computer to

request any report to be sent from any register, supports uploading and downloading of register memory. supports any number of registers and communication lines, provides the ability to send messages from the host computer to any register, pro

vides automatic repolling and sup-ports automatic dialing. Prices range from \$8,000 for a oneerminal system to \$45,000 for more

than 500 terminals. Office Park, Brookfield, Conn. 06804 Simware, Inc. has announced Memo, an electronic mail package for IBM mainframe computers running either MVS or DOS operating sys-

Memo, developed by Volvo Data cludes a full-featured text editor, message audit trail, directory search pability and 600 context-s ip screens. According to the ve dor, it can communicate with IBM's Distributed Office Support System, other mainframe applications, other Memo systems and Western Union, c.'s Telex network

Memo is priced at \$35,000, the vendor said. Simware, Suite 100, 14 Concourse Gate, Nepean, Ont., Canada, K2E 786.

Test equipment

Digilog, Inc. has announced the Digilog 300, a data analyzer said to offer 800,000 characters of random-

access disk storage, interface lead graphics and protocol analysis. The Digilog 300 monitors data on-line and captures data for off-line analysis. It tests line and device ac-tivity and can be fully remote-con-trolled.

The Digilog 300 operates at 19.2K bit/sec. It features a full typewriter-style keyboard, printer interface, 32K-byte capture buffer and a full 24-lead RS-232 breakout panel. lead RS-232 breakout panel. The Digilog 300 is priced

Digilog, 1370 Welsh Road, Montgo meryville, Pa. 18936.

Auxiliary equipment

Secom General Corp. has an nounced the AC 1000 Access Control device designed to protect main-

frames from unauthorized users.

The hardware-based device re sides outside the central computer. It provides password or password-plus per verification The AC 1000 base unit is pri

\$2,415. Each data key costs \$242. Three line cards, able to accommo-date up to 800 passwords each, are included. Each additional line card costs \$215.

Secom General, Suite 300, 26111 Evergreen, Southfield, Mich. 48076.

SYSTEMS & PERIPHERALS

Turnkey systems

Infomed Corp. has announced its Medical Work Station system for in-dustrial, medical and clinical screen-

dustrial, medical and cunical screen-ing and analysis.

The modular system is said to pro-vide the user with diagnostic mea-surements and reports. It enables the user to perform pulmonary function evaluation including pre-rand post-medication or shift tests. It also gen-

medication or shift tests. It also generates reports and documentation.

The basic system consists of a workstation, keyboard, monitor, 20M-byte hard disk drive, 512K-byte processor, 360K-byte floppy disk drive, serial parallel interface, enhanced graphics adapter, graphics board and software.

so includes an 8-litre dry roll-It also includes an 8-litre dry roll-ing seal spirometer with electronic transducer, spirometer hose, calibra-tion syringe, mouthpieces, a ques-tionnaire pad and operator's manual. The system is priced at \$10.485. Infomed, 13 Inverness Way S., En-



How Do You Handle Information Retrieval?

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Capitalize on the power and sophistication of BRS/SEARCH® -the software that runs one of the world's largest online database services—to cut your textual information management chall down to size.

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For optimal flexibility and total interface throughout your orga zation. SEARCH is available in micro, mini and mainframe ions—all utilizing the same versatile command structure. Take the rummage out of inefficient information retrieval. Call this toll-free number for full details on S/SEARCH tod 800-235-1209 (in NY State and de the continental United States, call 518-783-1161).

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business from the best position.

DCA has always bel network processors th It's nice to know

In a recent Datapro survey of network processor users DCA® received the highest overall performance ratings among the people who responded. As well as the highest ratings for several individual categories such as simplicity of installation, ease of expansion and quality of service.

The survey simply confirmed what we believed all along. Since we began making network processors over ten years ago, we've built products and systems with a different

philosophy than most of our competitors.

First, our equipment had to be modular. Each piece of new equipment is designed to be compatible with everything else we've made. If you wish to judge our success, consider that the first network processing hardware we made in 1974 works perfectly with the latest 1986 model.

Second, we wanted to build equipment that was software-

based, not hardware-bound.

The fact is we knew that our networking concept had to be built on flexibility to be truly successful. Networks are always in a state of change. Needs shift, personnel shift, so information handling capabilities must do the same.

Because we're software-based, that flexibility is built into

ieved we offer better an any other company. that you agree.

DCA	ATAPRO NE		-	3.8
				3.7
Amdahl				5.7
IBM			3.4	-
NCR Comten			3.4	
Codex			3.4	
Burroughs		3.3		- 40
Honeywell		3.3		
Sperry	3.1			

each DCA system. Even the most radical modification of your network can often be accomplished with a simple programming change. That means work flow won't be interrupted to any great degree.

interrupted to any great degree.
So we'd like to thank all the people who participated in the Datapro survey. We couldn't have said it better ourselves.

For information about DCA's networking products, call 1-800-241-4762, EXT. 504.

NEW PRODUCTS/SYSTEMS.& PERIPHERALS

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Processors National Instrum

d the first in a series of IEEE-488 general purses (GPIR) the GPIB-3B2 Targeted for the AT&T

Targeted for the Alai 3B2 computer family, the GPIB-3B2 interface features an on-board intel Corp. 80186 processor, 128K bytes of memory and a data transfer rate from the GPIB of

790K bit/sec. Programs can be develed in National Instru-nts' IEEE-488 Bus Control nguage and then down-ded to the GPIB-3B2 for

Included with the product is a standard NI-488 C lan guage interface, an interac-tive control program and a

tion program.
The GPIB-3B2 interface is priced at \$1,795. National

screen-oriented

Instruments 12109 Technology Austin, Texas 78727.

Computer Designed Sys-tems, Inc. has introduced the Advisor 2210, the first memher of the Advisor 2200 series of Interactive computer

The 2200 series is said to offer an instruction set con-sisting of fewer than 80 in-

The 2210 features a 192K-byte cache, 20M bytes of memory, four I/O ports, a local-area network conn system dictionary and data

The maximum configura-tion is 40M bytes of memory, 13.1G bytes of disk storage, 48 printers and up to 512 ter-

The Model 2210 is priced at \$245,000. Computer Designed Sys-tems, 10911 Olsom Memorial Highway, Minneapolis, Minn.

Graphics systems Chemical Design Ltd. has introduced the Micrograf-4 molecular modeling software

and hardware packaged sys The Micrograf-4 is based on a Digital Equipment Corp. Microvax II and the Sigmex

6164 graphics workstation The system features 1,448 by 1,024 pixel resolution, planes providing 256 sim and the taneous colors and the Graphical Kernal System in-

graphics. Micrograf-4 supports up to users simultaneously Eight of these users may be using Chemical Chem-X software. Chemical Design's Prices for the Micrograf-4

range from \$95,000 for a sir gle-user system to \$500,000 for a fully configured system

Chemical Design, Unit 12, 7 West Way, Oxford, En-gland, OX2 0JB.

Data storage

Alpha Data, Inc. has an-nounced the Atlas 520, a 520M-byte Win-hester-type disk drive

The newly unveiled disk rive is said to offer access to 2.25M bytes of information without necessitating head

The Atlas 520 provides a cess time of less than 18 msec using 76 moving heads over 14-in, rigid disk plat-

ters.
The disk is interface and format compatible with ANSI enhanced storage module device specifications and existing hardware and software configurations. configurations.

be linked through operating controllers in order to provide a to-tal of 1,040M bytes of stor-

e. Atlas 520 is priced at \$10,000.

Alpha Data, 1255 Lincoln , Santa Monica, Calif.



At\$395 others have found orice easier to ormance.

If you want maximum performance and maximum quality at minimum cost, you need to put the resources of ITT Qume on your desktop. For more information, call (800) 223-2479. ITT Qume Corporation, 2350 Qume Drive, San Jose, CA 95131. Telex: 40970122. TWX 910-338-0232.



EW PRODUCTS/SYSTEMS & PERIPHERALS ...

d the Le

ch is said to have a 13-in.

ording to the ver rately dispense new, used or a mix-e of new and used currency witht any adjustments. The Touch also contains a self-di-

mostic system. It is designed for interior or lobby, rough the wall and island drive-up

Prices for the machine start at are, 308 29th St. N.E., Cedar

Rapids, lowa 52402.

ITT Courier Terminal Systems has announced the ITT 9210 green, ITT 9212 announced the ITT 9216 green, ITT 9218 seven-color displays.

All three displays are IBM 3270 compatible. They all feature dual logical units, programmable security locks and full extended data stream,

ng to the ver according to the venture.

They are designed to operate with ITT 9000 series systems network architecture or binary synchronous communications local and remote

The ITT 9210 and ITT 9212 m chrome displays are priced at \$1,550. The ITT 9216 seven-color display is

iced at \$2,180. FTT. P.O. Box 29039, Phoenix,

Ariz. 85038.

Electrohome Limited has u veiled the EDP-56XL, a high-brigh high-resolution mor ata and graphics projection system
The EDP-58XL projector feature
CRT with a maximum brightner

a CRT with a maximum brightness rating of 500 lumens in a green for-The system includes a special cell-ing mount along with a floor or desk

It also includes a range of inter-

faces for most computer terminals and personal computers. The EDP-58XL projection system Electrohome Limited, 809 Welling-ton St., N. Kitchener, Ont., Canada, N2G 4J6.

Zenith Data Systems Corp. has introduced the ZYM-1860 high-reso-ution color video monitor. The color video monitor features a ong-persistence phosphor CRT. It also features a 13-in. diagonal re-

duced-glare screen.

The ZVM-1360 offers a resolution of 640 by 240 pixels in the noninter-laced mode and 640 by 480 pixels in the interlaced mode in a 50-line by 90 abox format The monitor supports an LED indi-cator and on/off, brightness and con-trast controls. It includes a nine-pin

The ZVM-1360 color video monitor is priced at \$799.
Zenith Data Systems, 1000 Mil-waukee Ave., Glenview, Ill. 60025.

Printers/plotters

MDB Systems, Inc. has announced a series of Pederal Communications Commission-compliant line printer controllers for use with printers having Centronics Data Computer Corp. or Dataproducts Corp. inter-

Said to be completely transp to all Digital Equipment Corp. LP drivers and diagnostic routines, the controllers consist of the quad-size base module, a 10-ft internal cable and a single-unit-size connection in

sert panel.

A long-line version of the control lers is also available.

The standard interface version of the printer controllers is priced at \$950. The long-line version is priced

MDB Systems, 1995 N. Batavia St., Orange, Calif. 92665.

Power supplies

Dynatech Computer Power, Inc. has introduced the Powerhouse/ 500, a standby power supply. The Powerhouse/500 is said to respond within 5 msec of any power

AC power during a bisckout.

The standby power supply system also responds to power line transients such as brownouts, surges and

voltage dips, according to Dynatech Computer Power. The unit contains four AC recepta cles for computers and peripherals drawing up to a total of 500W at

The Powerhouse/500 is priced at

8795.

Dynatech Computer Power, 4744
Scotts Valley Drive, Scotts Valley,
Calif. 95086.

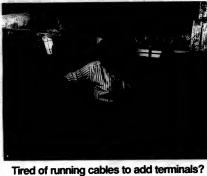
Deltron, Inc. has introduced the VF series of system switchers. The VF fan-cooled models offer power densities greater than 3W per cubic in. These models are available in 500W to 1,750W, one to five out-

parallel operation in true redundant operation, no derating parallel or re-

operation, no derating parallel or redundant service, output good signals in redundant mode, margining and autodynamic bleed.

They also offer all outputs floating, 80 kHz conversion frequency, 80% typical efficiency, nondissipative housekeeping blas source pricing model soft start.

Pricing ranges from \$220 to \$845. Deltron, P.O. Box 1869, Wissahickon Are, North Wales, P.E. 1944.



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Equinox LIM-8 and LIM-48 Local Multiplesers connect directly to our popular Data PEXs. So the Local Multiplesers you install today can build used comprove as terminal servers a fully featured async Local Area. Network: This upgrade from cost-seving data distribution to lose-cost data multiples late up- notice.

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to all date, they work with visit any serye terminal, priviter or computer. Easy to install, Equinox Local
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The problem is familiar, DP/MIS gets are already straining while PC u are demanding faster response time and greater access to mainframe data and resources. But Canaan Computer Corporation solution short of installing IBM mainframes in each department.

Now, users can run and develop IBM mainframe applications on the industry's most cost-effective departmental computer. The Cansan DCS 5800" Departmental Computer lets up to 36 users run unmodified IBM 370 VM/CMS mainframe applications department by department, instead of on It gives PC and terminal users fast

response time and the full power of main-frame applications as well as database access.

Cost effectiveness also means flexible connectivity. The DCS 5800 connects with connectivity. The DAS 3800 connects with the PCs and terminals you already have: IBM PCs, with or without IRMA" boards, 3178/3278 terminals, DEC VT 100s/VT 220s and many other ASCII terminals.

And, of course, it lets departmental users share printers, disk drives, soft-ware and information all within their own work groups.

THE CONVENIENCE OF RUNNING EXISTING APPLICATIONS AND THE POWER OF DEVELOPING NEW ONES The DCS 5800 won't disrupt users'

workstyles-they still run the same mainframe applications they're accustomed to, including IBM's Professional Office System (PROFS), fourth generation languages and decision support applications. Even IBM's ISPF, compilers, editors and debuggers Without requiring any additional

training, MIS staffing or mainframe burden, the DCS 5800 also lets users develop and test CICS and ISPF applications in each

MATE DEPARTMENTALIZES RAME CAPANILITIES

Multigate, Canaan's family of commi cations software, integrates users, departments and MIS into a unified corporate information system, sharing information and applications. Multigate PC "Plus" is an advanced PC

communications software package that gives users the advantages of virtual disk capacity, pop-up menus and a complete PC applica-tion shell. Multigate 3274 BSC gives them additional transparent passthrough and log-on with simultaneous sessions to VM and MVS mainframes. And Multigate LAN provides Ethernet commu ations at the

departmental level among DCS 5800s and other minicomputers. THE DCS 5000 DAYYES COSTS DOWN AND PRODUCTIVITY UP Canaan's DCS 5800 provides immediate

productivity with third party software we carefully test and certify for our growing library of commercial IBM 370 packages Packages like FOCUS, RAMIS II," STRATA-GEM" and MODEL." All running on the DCS 5800 at a cost as low as 1/10th that of running them on a mainframe.

No other system is like the DCS 5800. It's the solution that users and DP/MIS can

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Components MDB Systems, Inc. has mounced the MLSI-BA11-

n chaosis and nsion set for Digital computers.

The expansion chassis, to-gether with the three-board expansion set, is said to al-low six additional quad-size or 14 dual-size modules onto the Microvax II. According to the vendor, it allows modules totaling up to an additional 20 DC bus loads to be inserted into the expansion chas-

sion set reportedly can be used with other expansion

chassis as well.

The MLSI-BA11-EXP expansion chassis costs \$3,595, and the MV-DB11-E expan-

m set costs \$1,945. MDB Systems, 1995 N. Ba-vin St., Orange, Calif.

Xylogics, Inc. has an-nounced the Model 712 VME/ESDI disk controller. The 712 controller was de-

ed on a single standard signed on a single standard VME-size board. It is said to support VME 32-bit address and data and industry-stan-dard enhanced small-device interface (ESDI) disk drives up to and including the 1.2M bit/sec. devices. According to the vendor, it can support four ESDI drives.

Other features include a parate 2K-byte command buffer as well as an 8K-byte first-in first-out buffer, the vendor said

According to Xylogics, the product has programmable interrupt levels, vectors and dress modifiers. The 712 ESDI disk control-

ler costs \$1,295. Xylogics, 144 Middlesex Burlington, Mass.

REDUCTIONS ex Corp. has aned price reductions or er/8000 add in memory as for the IBM Series 0 mainframe comp stor/8000 memory

coording to the vendor

The price of the 8M-byte add-in memory system is now \$49,000. and Ave., ham, Mass. 02154.

EMC Corp. has an ice reductions for its E38-2 i-byte add-in memory

2M-byte add-in memory board for the IBM System/38 Model 40. According to the vendor, the card uses 256K-byte ranse memory technol

ogy coupled with EMC's pro-prietary hybrid circuitry. The price for the E38-2 is

EMC, 12 Mercer Rok, Mass. 01760.

oft Corp. e, a package be aintbrush, Friese, runtation, Fontpak and

ics and paint program. Priese is said to take snapshots of graphics screens in oth programs. PC Presentation said to be a slideshow pr

Fontpak/S1 provides 25 type styles. Chart interpret-er reportedly allows users to load Lotus Development

Corp. graphs.
The Design priced at \$235. Circle, Marietta,

IBM ASCII terminals:

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gives you clear, crisp characters in color. But is color any reason to buy IBM's 3164? It is, accord-

ing to studies that indicate ing to studies that minutes the use of color increases productivity, decreases errors and promotes user satisfaction. Color, of course, is far from

the sole reason for choosing the 3164. To appreciate the others, you should get to know the rest of our ASCII family.

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	3163	IBM 3101 Model 881 DEC VT 52* DEC VT 100* TeleVideo 950*	
ı	3164	IRM 3loi Model 88i	

For example, our basic ASCII Display Station, the IBM 3161, emulates up to six

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terminals. And the advancedfunction 3163 emulates a number of higher level ASCII data streams.

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MAY 5-7, GENEVA — Second World Congress of Production and Inventory Control. Contact: World Con-gress Secretaria-2F, 500 W. oad. Falls

Church, Va. 22046.
May 5-7, WASHINGTON,
D.C. — Twelfth Annual Federal DP & Communications
Conference. Contact: Linda

The Interface Needham, Mans. 02194.
Needham, Mans. 02194.
MAY 5-7, WILLIAMSBURG, VA. — AM/FM International Regional Con-

Antomated o On Antomated ag/Pacilities Man-nt. Contact: Barbara Emery, Contract Administra-tor, AM/FM International,

820, 8775 E. Orchard d, Englewood, Colo. 80111.

MAY 5-9. NEW YORK MAY 5-9, NEW YORK — Atlantic Systems Guild Modern Structured Design Workshop, Contact: Palmer Consulting, 353 W. 12th Bt., New York, N. 10014. MAY 5-9, SAN FRANCIS-CO — Harmon Associates Seminars and Workshops. Contact: Harmon Associates, 151 Collingwood, San Fran-ciaco, Calif. 94114. MAY 6-8, ATLANTA —

cal Area Networks. Con-it: Trish Stolton, Depart-ent of Continuing Educament of Continuing Educa-tion, Georgia Institute of

WEEK OF MAY 11

MAY 11-14, NEW ORmaf 11-14, NEW OR-LEANS — Association for Systems Management (ASM) Annual Conference. Contact: Richard B. McCaf-frey, ASM, 24587 Begley Road, Cleveland, Ohio 44138

WEEK OF MAY 18

MAV 19-21. HILTON HEAD, S.C. — Audit Managers Symposium VII. Contact
MIS Training Institute, Inc., 4
Brewster Road, Framingham ste, Inc., 4 ond, Framingham,

Brewater Road, Framingham, Mass. 01701.

MAY 19-21, SAN FRAN-CISCO — Hammer Forum West: Change and Contin-ity in End-Uner Computing. Contact: Michael Hammer, Hammer and Co., Five Cam-bridge Center, Cambridge, Mass. 09142.

noge 02142. Mans. 02142.

MAY 20-23, ORLANDO,
FLA. — Techeu: '86 Americas: The Amunal World Fair
for Technology Exchange.
Contact: Anne E Klenner, Dr.
Dvorkovitz & Associates,
P.O. Box 1748, Ormond
Beach, Fla. 32075.

WEEK OF MAY 25

MAY 28-29, WASHING-TON, D.C. — Systems/34, 36 and 38 Users Show. Con-tact: Andrew Wahters, The Producers, 360 Merrimack St., Lawrence, Mass. 01843. MAY 29-30, SAN FRAN-CISCO — Unix In Focus. Contact: International Data Corp., Suite 201, 3350 W. Bayshore Road, Palo Alto, Calif. 94303.

MAY 29-31, BLACKS BURG, VA. — Persons MAY 29-31, BLACAS-BURG, VA. — Personal Computer Interfacing For Scientific Instrument Auto-mation. Contact: Linda Lef-fel, Virginia Polytechnic Institute and State University, Blacksburg, Va. 24061.

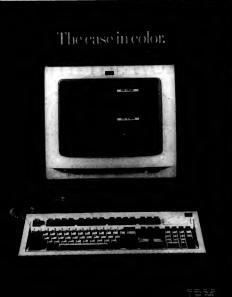
WEEK OF JUNE 1

JUNE 2-5, DETROIT -Vision '86 — Applied Ma-chine Vision Conference and Exposition. Contact: Vi-sion '86 Public Relations, Machine Vision Association of the Society of Manufacturing Engineers, P.O. Box 930, One SME Drive, Dearborn, Mich 48121

JUNE 2-5, NASSAU BAY JUNE 2-6, NASSAU BAY, TEXAS — International Symposium on Ada Pro-gramming Language Appli-cations for Space Station Development. Contact: Uni-versity of Houston — Clear Lake, 2700 Bay Area Blvd. Houston, Texas 77058. JUNE 4-6, SAN DIEGO — 1986 National Educational 1986 National Educational
Computing Conference.
Contact: Susan M. Zgliczynski, National Educational
Computing Conference 1986,
School of Education, University of San Diego, Alcals Park, San Diego, Calif.

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JUNE 7, BELJING — China-Didacta '56: The Interna-tional Trade Pair for Educa-tional Equipment. Contact: Swiss Industries Pair, Secre-cariat China Didacta '36, P.O. Box GH-4021, Basel, Switzer-

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Users playing with a full DEC

was were raised. But the product is more consistent and more comting the product is more consistent and more comting the product is a superior consistent and the product is a failed with a superior consistent and the product is a failed with a superior consistent and the product is a superior consistent in the product is a superior consistent in the product in the product is a superior consistent in the product in the product is an element of the product in the product in the product is an element in the product in the product in the product is an element in the product in the product in the product is an element in the product in the product in the product is an element in the product in the produ

"PEC was, up to this point, weak marketing strategy compared to M. They were typical of engineer-strolled firms," says William I, iney, director of data services at ited Telephone of Florida in Altate Springs. His company has in ed large IBM systems for manet information systems a

itive weapon for battli nercial as well as engi-

of and scientific markets. ors, analysts and DEC officials Users, analysts and DEC officials themerives seem to agree that even with clusters of its high-end 8680 and 8800 systems, DEC machines will seldom replace IBM maintrames. But they expect DEC to carve out a place in IBM shops as a front-end processor supplier for those large IBM systems, whether at the department level or in a worldwide distributed network, and as a vendor for

uted network, and as a ven new applications. Indeed, companies are m

Indeed, companies are moving DEC equipment from the back room of their engineering departments to the front office. They are sixing new VAX systems with old VAX, PDP-11 and Decaystem equipment and tying IBM Personal Computers into Decnet or VAXs into IBM main-

in Texas, which previous DEC equipment for its er started using DEC machi

started using DEC machines in non-traditional jobs. The utility has turned to a three-tier information systems approach. DEC systems and applications constitute a new middle level, between an IBM mainframe top tier and an IBM-compatible personal

tier and an IBM-compatible personal computer bottom tier.
"We did a major evaluation of all the big players, and when the final analysis was said and done, DEC came out on top," says Joseph Ivison, principal systems planner. The principal contrasting in such as surfronzenic is "The time classes" of the principal systems planner. The time class of the principal systems planner. The time class of the principal systems planner. The time class of the principal systems of the principal systems of the principal systems of the principal systems. The principal systems of t

office systems capabilities and con nect better to the IBM world than mpeting systems, Ivison remark

It often is easier to link two IBM It often is easier to link two IBM mainframes through a VAX than to connect them to each other, says United Telephone's David Baker, manager of office automation systems. "That is especially true with the IBM Distributed Office Support System," he mays. "The DEC gateway very short."

into Disoss is very easy, very clean. The 170,000 network connection that DEC claims worldwide are a mination of Decnet dev work that began in the early 1970s. work that began in the early 1970s.
"It was a massive job; it was extremely complex?" Olsen says. "I am
sure we lost money on every product.
for the first several years, despite what the accountants might say."

Another long, slow evolution has
See USERS page 121

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DEC equipment for office automa-tion and specialized toll chargeback "In the past year, DEC has made big strides," Gainey says. "They have always had a much better prod-

uct than the general public per-ceived, and they have finally got that point across."

Founded by Kenneth H. Olsen in

1958, the company that popularized the minicomputer had enjoyed a steady rise in profits and revenue throughout the late 1970s into the 1980s. But three years ago tough

Customers greeted even mainstream system announcements such as the VAX-11/785 as nonevents. They complained loudly when DEC cut off development funds for its only mainframe. Moreover, DEC seemed locked into its traditional en-gineering and scientific markets, with the company's products still pegged as techie machines that only

gineers could love. Profits dove by 32% in 1983, with only a slight recovery in 1984. Olsen

only a slight recovery in 1984. Obser was under fire from all sides for moving too slowly, and rumors flew that a deep-pocketed sponsor like AT&T was about to acquire DEC. But today DEC has replaced its entire VAX line with a second-generation family that ranges from a pow-erful new pair of high-end machiness down to the popular deskide Micro-vax II. And the company has lever-need its networking expertise as a

Decsystem owners cope with DEC's shifting strategies

Frustration gives way to gradual acceptance

By James Connolly
The two-year wait for the product
ode-named "Jupiter" ended at Digital Equipment Corp's Decra users
group meeting in May 1983. But in
place of what users expected to be
the 1,500 Decrystems installed at
that time was DEC's announcement
that it was abandoning the line to that it was DEAC a announcement that it was abandoning the line to concentrate on the VAX family. Owners of Decaystem-10s and Dec-system-20s were disappointed and, in some cases, angry. Some of them said at the time that they would have ordered a Jupiter system as soon as it was amounced, while oth-ers said they feared having to re-write all of their software designed for the Decaystems' (DPS operating system to run under the VAX line's

indicate, however, that emotions have mellowed with the passage of me and as DEC's VAX strategy taken a clearer form.

CAN COMMUNICATE

Decsystem owners such as Frank Zazo, director of systems at Bantam Books, Inc. in New York, have made plans to cope with DEC's change in Bantam runs two Decsystem-

WITH THE WORLD.

2065s, one in over a the Chicago area.

Zazo says that at one time the chicago says that at one time the chicago says that at one time the chicago says that a chicago Zano says that at one time those ystems were near capacity, but Ban-im relieved some of the pressure by iding DBC Microvaxes as front-end rocessors for I/O tasks such as or-tr entry, which in turn has post-yned a decision to replace the Dec-

III move to VAX

"In the long run we are probably going to move to a VAX. We are a DEC shop and are pretty satisfied with DEC. We feel we have a couple more years of life left in the 2065s. We were top ended but the Microvaxes have given us some help," he

manager of mother Decysmanager of mother Decysmanager on each adout, 1,000
mill operating wordwide as of early
1006, according to international Data
Corp. estimates — reports that he siready has began the transition from
a Decys wordwide as the transition from
a Decys wordwide of the Corp.

The Manager of the Corp.

The Ma bullet — go VAX or stay with the 20s forever — but 1 don't like going with a model where the manufacturer is basically getting out of it," may Bar-clay. He points out that converting when he did will provide enough time to move applica

Barclay and many peers considered a shift to IBM when DEC said it would not extend the Decsystem fam-

"We took a look at IBM, but IBM was offering a System/38, and, fore-casting outside the next five years, if rew that we would have been going to the 4300, which would have meant another whole conversion. So, l ended up deciding on Digital because of the VAX compatibility upward and beyond," he says.

The 8200, which was installed ea

ly this month, allows him the flexibility to migrate to a larger VAX system as a mainframe, or to move toward a

oecentralized network.

Barclay says that at Andre, which
uses its DEC equipment for general
business functions such as financial applications, production and marketing, the biggest challenges in the con-version from the Decsystem's TOPS operating system to the VAX's VMS will be educating the DP staff in the finer differences between the operat ing systems and in rewriting most of the major corporate files in the data

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Users playing with a full DEC

been that of the VAX pro

ily and its VMS operating system ily and its VMS operating system. "We looked like the last people in the world to design a 32-bit processor, but we designed for the future," Olsen says. "Now the VAX line goes from the small computer on the desit to large computers able to run the largest MIS system." Bratabilishing a single architecture supporting one operating system at all levels "burne out to be extremely profound because no one lead of it," he mala-

tains.
The payoff has been that the systems DEC took so long to design are selling like hotcakes. The company sold 2,000 VAX 8600 and 8650 machines in a little more than a year and had sold 12,000 Microvax II suicros between its introduction in May and the end of December (see story page 130).

Bold R&D, manufacturing changes frame DEC success

I onestanding efforts produce dividends

aquipment Corp.'s current mandal successes depend on two despirations that coupers of the couper

en up ---real years.

AD: "Looking at Digital from the
ide, we ought to be seeing 8% to
spending on R&D," comments

Sam Puller, DEC vice-president for research and architecture. "However, it's now around the 10% to 11% range," he says, and he does not expect spending to drop soon. By comparison, IBM spends about 9.5% of sales on R&D.

tecture for a product line that now spans from sin-gle-user Vaxstations to the VAX 8800, DEC also has

poured massive engineer-ing resources into net-works and distributed environments. It claims some major The biggest computer net

world are built on Decnet," says. "I work on a network Fuller says. "I work on a netw with on the order of 5,000 nodes." less than four days, DEC networked more than 400

computers, in an unconthe Decworld exposition Some network co

nents took longer than expected to appear, Puller notes, with a prime case being third-party Ethernet hardware. "We really un-derestimated the amount of time it would take to get cost-effective chips. In the late 1970s, DEC also began

making enormous investments in disk drives. "We're now competitive with the Japanese and IBM in terms of underlying magnetic storage tech-nology." Fuller says. "That took a number of years to show up in the

More spectacular is DEC's plunge conductor technology, in which it now invests tens of millions

While the glamour in sili CPUs, areas such as graphics pose similar challenges, Fuller remarks. The complexity of graphics silicon in DEC's GPX workstation ows that in the Microvax CPU itself. Puture work will emphasize both distributed systems and human inter-

faces, Fuller says. "If it's as much of an effort to bring up VMS on a work-station as on an 8600, we've failed."

Manufacturing: "Three years ago, we were not performing at a level of

ence true to our history or to our customer requirements," says Herb Shumway, DEC's manager of manufacturing programs. "From a manufacturing point of view, we had

some catching up to do."

After explosive growth in the 1970s, DEC found itself with huge inventories and a need to cut costs. As one step, "we set out to freeze our one step, "we set out to freeze our hiring and let attrition lower our head count down," Shumway says. Manufacturing employment has dropped from 30,000 to 26,000. DEC benefited from some overall

changes in manufacturing technol-ogy during the past several years. "The biggest fundamental shift has been the elimination of the third stage of manufacturing," in which complete systems are as tested. Shumway says.

Newer systems also typically boast far fewer components. Because of these trends, and because of in-creased management scrutiny, DEC has cut inventory levels by about one-third over the past two years while speeding up shipment times,

according to Shumway.

DEC is now investing heavily in base technology and in higher cost fixed capital investments, with semiconductor and thin-film production

facilities being particularly expen-sive, Shumway adds. With plants worldwide, DEC is always balancing economies of scale vs. the advantages of local presence In addition to tariff considerations, local plants help the company position itself as a business partner for its customers. "Chasing low labor its customers. "Chasing low labor costs around the world doesn't play into the scenario of developing that



You may have heard some form of the saying, "When you're up to your gluteus maximus in alligators, it's hard to remem-ber you started out to drain the swamp." if that's beginning to sound uncomfortably like your ic

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Users playing with a full DEC

In addition, DEC has continued to make less spectacular moves than the reworking of the VAX line. It ntains a steady flow of income with its terminals business and en-hances and downsizes proven nich products such as the PDP-11 series And DEC products continue to com-See USERS page 126

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of piecesseal "quiest lines" but should have been used to the disper-sate of the pieces of Software AE. I from our one purchast, ADMAN on the case of Software AE. I from our one purchast, ADMAN of the pieces of the pieces of Software AE. I from our one purchast, ADMAN of the pieces of the piece

Fourth-generation technology: Who needs it? Who's got it?

a lot of hot air on the subject of fourth generation languages. And we'd be the last to deny that a welldesigned "4GL" can be a phenom-enal productivity tool — as much as 10 to 20 times more productive than COBOL, for instance.

But if you want to see perfor

nce 1713.
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sanonsane was the surveyer vensur.

And for many years, we and our users have recognized the sportance of that relationship. Its fact, we have worked gether to shape it in the interests of delivering the best easible product performance.

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t while we re good out used their comments.

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Users playing with full DEC

while in a person of the state of the state of DEC, sale of DEC, sale of DEC of the state of the tet research firm all Data Corp. fig-hipped only

company's hopes not to be tied to the IBM-tible Vaxmate (see sto 127), expected next and to the ability to vendor's PC into ased Decnet configu-

ng other development EC probably has fun-ore into artificial in-or technology than er firm, although

kept in-house.
The company also sticks with unpopular technologies like videotex, working to improve its systems even though the overall videotex

stribution to use ross the state, Bai

gram. Customer ser-vices has as an objec-tive in one of its groups to reduce pa-per reports by about 50% this year. So the videotex is going to see a lot of action," he explains. "Videotex is

obably the most im-reant tool we have on the system."

erations have been erhauled (see story ge 122), and the hole firm has been committee. oughly restruc-d. Previously di-d into more than

Many of DEC's top entre

reneurial managers fled. but the end result, according to analysts, was a trimmer, more efficient company.

Some of the shake-ups hit the sales organ sation, as regional exe-stives were replaced.

ntatives or three years ago. But more important, they say, the sales representatives are more knowledgeable about DEC's products

"In the past it was a little bit more of a hit-or-miss type of sales approach, al-most a retail kind of am concerned. You just didn't understand how a product like a relational data base fit into their base fit into their overall strategy. Now we are getting a lot more insight into where DEC is going," says Rexnord's

says Rexnord s

A wait.

One DEG user from
the Midwest who asks
that he not be identified explains, "Three
years ago you had to really
want to buy from DEC, because their sales force did
not understand how to mar-

ket the equipm

port, a trad better reputa ms up Dennis S

num up Dennis Seavone, manager of information services at Morgan Construction Co. in Worcester, Mass.

"One thing I am pleased with is in the support area; it doesn't seem to matter who you call," may Bugh Barclay, DP manager of Andres Wines, Ltd of Winona, Ont. "You can talk to field support, field service, a sealer support a software guy, and they seem pretty responsive, even or a software guy, and they seem pretty responsive; eve if it is not their particular problem they will certainly take the ball," Barciay add:

take the bail, "Barcaly about However, users accus-tomed to dealing the IBM way — getting fast and free support for products, such as customization of software — may be shocked when DEC insists that customers pay for that kind of support.

If DEC continues to go af-ter the mainstream MIS mar-ketplace, it will have to roll service costs into its prices and offer the same kind of support that IBM does, pre-dicts Houston Lighting and Power's Ivison. See USERS page 127

Why does Pier 1 think the world of Zeke:



Pier I Imports has good reason to salute Zele automated scheduling. "Zeke reduces restart errors by as much as 65%," says Production Mana Ginny Johnson. "It speeds operations. Keeps work flowing

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'Our strategy is not to sell at

Market strategy leaves DEC floundering in micro arena

IBM PC compatible may be missing link

by Eric Bender
Ironical Digital Equipment
Ironical arguably has done more
than any other supplier to transform
computers from mysterious backroom beautic supplier to transform
computers from mysterious backroom beautic supplier to transform
computers from mysterious backsonal computer market. The situation
sonal computer market. The situation
national Data Corp. (IDO), for one,
estimates that U.S. shipments of DEC
personal computers dropped from
DEC introduced three incomputi-

DEC introduced three incompati-ble micro systems in late 1982 — the Rainbow, which ran Microsoft Corp. MS-DOS software but was not com-patible with the IBM Personal Comand was originally positio

s a CP/M device; the Pro sional, designed as a downsized PDP/ 11 workstation; and the Decmate II, a word processing machine. "At the end of the winter they will be roaring out," DEC President Kenneth Olsen predicted at the tim

predicted at the time.
However, the products arrived late, overpriced and incompatible with the rapidly emerging IBM statement of the products are self-similar to the result of the res strategy is not to sen at retail, our strategy is to tie things together." However, the lack of a strong and

However, the lack of a strong and inexpensively priced micro has left a missing link for many DEC users building distributed computing environments. One example occurs in running DEC's All-in-One software, which never any offers many advanwhich users say offers many advantages but eats up resources on a VAX.
From a systems resources point of

Users playing with a full DEC

This would not be the only tech nology or strategy borrowed from the company that is seven times DEC's size.

DEC's size.

DEC is toying with the idea of software leasing, has recognized the IBM Personal Computer standard, is cracking down on unauthorized third-party development and is keeping a closer check than in the past on the standard past on the season of the season of

tain a distinctive style — in one trivial example, last year it remo-the IBM-blue background for the word "Digital" on its corporate b

view, it makes sense to handle word processing under All-in-One on a person All-in-One on a pe

tegrated manufacturing

DEC's high p on micro producti

on micro products,
"it's cheaper to get a
VT200 and a large
computer, although
in the long run that's not the way to
do it." he says.
Almost alone among major com-

ted two race DEC is still actively m

of the control of the n slow to produce PC hooks into

satisfaction with the periormance of their machines.

"My Rainbow has been sitting here running 24 hours a day just flawlensly, never shut off for over a year," says Mark Bornstein, who runs an electronic bulletin board and

The triumph of technology over time



NEW

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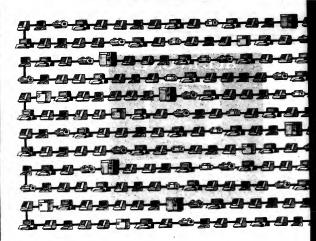
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Sytek

Microvax II gaining wide acceptance among MIS managers

"VAX-on-a-chip" relieves CPU burden

Denna Raimondi
Digital Equipment Corp. unshed its 32-bit Microvax II — the
called "VAX-on-a-chip" — in May
So and then stood by to watch the
stomers stampede. Based on a prestary very large-scale integration
go that put the power of a miniconter in a micro-size box, the supercro seld 12,000 units by the end of
sonder very 1995.

ly placed Microvax IIs provide pow-

heavy users or multiuser depart-ments. At the same time, the low end of DDTS is second-spectrum of V.Z. lim-less and the same time, the low end of DDTS is second-spectrum of V.Z. lim-less and the same time to the con-traction of the same time to the con-traction of the same time time to the con-traction of the same time time time to fail to the same time time time time time to the VAX-11/786 that is being used primarily for divise submation. One support in batch mode as engineering department out analysis application. partment cost analysis application at currently takes up 30% of the

vax II will be used by engineers for network and service planning; the mailtenance and construction budget sections that utilize about 25% of CPU time will use the third unit. "That will buy us the CPU that we need to make it through the year," says David Baker, manager of office asys David Baker, manager of office

"When we started our OA pro-

"When we started our OA project, our view was that one or two large DEC VAX processors would provide the support for the hundreds of users of the OA system," says Charles Laplen, president of information systems at Libby Owens Port Co. in Toledo, Ohio. "Our view has changed, in that we are now going more to de-partmental systems where the pro-

cessor resources for a particular de-partment can be dedicated to them."
Libby Owens Ford bought 10 Mi-trovax IIs that are networked via Ethernet to shared VAX minicomput-ers for file server processing, networking and gateway access to the company's large-scale IBM main-

The Microvax II does everything a The Microvax II does everything a VAX minicomputer can do except connect to a Vaxcluster, a fact that "reduces the possible ways we can use it," says Gerry Adams of Manu-facturing and Consulting Services, Inc. (MCS) in Irvine, Calif. MCS em-ploys the Microvax II for developploys the Microvax II for development, testing and demonstration of software written for 32-bit virtual memory machines from several vendors. "We run the same programs and access the same files on the Microvaxes as on our other VAXs, and that

vaxes so our other VAX., and that makes it says to get the programs and files nere bet a still have to have the displacation," he explains the displacation, he explains the displacation, he explains the displacation, he explains the displacation, he explains the choice in engineering, because it is near the VAX-11/780 in performance and costs less than \$30,000." says Van B. Norman, head of simulation operations at Autosimulations in Bountful, Utah.
Autosimulations has four Mannatonic and Control of the Control

Autosimulations has four Microvax IIs networked vin the Transmis-sion Control Protocol/Internet Proto-col to two VAX-11/750s, an IBM 4300 and four Silicon Graphics, Inc. Iris workstations. The system is a "very, very reliable machine," he says, pointing out that in four processor-years-worth of experience he has had one disk control fallure. "We are very happy, obviously."



TOKYO — Encouraged by brisk sales of its sophistical catef 680 series mainframe and networking products. Hitachi Ltd. has increased its computer manufacturing capacity. The \$44 million effort is intended to boost productivity at the firm's main computer plant. by 20% during the next year, the

company said.

Hitachi said its increased commit-ment to improving its computer man-ufacturing capability results from continuous sales markups on the 680 series, which is equivalent to IBM's 3090 line.

TOKYO — IBM's planned shake-up [CW. April 7] of its of the Corona is viewed as another sign of the company's commitment to fortify its Jaganese subsidiary for a battle its Jaganese subsidiary for a battle to IBM Japan Lid. President Takeo Shina, the recognization "means Shina, the recognization "means for Group and the whole IBM framework will likely be enlarged." The wholly owned Jaganese subsection of the recommit its role as leader of the recommit its role as leader of the re-

ment its role as leader of the re-mal group in a bid to contribute ore heavily to IBM's overall



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COMPUTER INDUSTRY

Intergraph's success finds it poised to take on Big Blue

Passed Computervision for No. 2 position in CAD/CAM market

- Having

clearly surpassed Computervisic Corp. in · mputer-aided design ar manufacturing (CAD/CAM) revenu manufacturing (CAD/CAB) revested and market share last year, Intergraph Corp. became one of the few computer industry success stories in 1885. But success is about to bring integraph its greatest challenge of all. With loss-plagued Computervision off in third place among CAD/CAM vendors, Integraph is about to bring head-to-head with the market leader,

"There's no question that IBM is the key competition now," says Tony Loigu, executive manager of major account development at Intergraph. In 1985, after 14 years in the busi-

In 1985, after 14 years in the busi-ness, Intergraph grabbed the No. 2 slot among CAD/CAM vendors as Computervision, which had been No. 1, fell to third place. Intergraph's revenues grew by 30% to \$525 mil-tion, giving it a 15% market share, ac-cording to Daratech, Inc., a market

research firm in Cambridge, Mas With this shake-up in the ma Intergraph, traditionally a low file company, will have to marke

me company, win nave to inance in products more aggressively.

"The more the decision-making for CAD systems moves toward the MIS director, the more intergraph will be at a disadvantage to IBM," says Charles Foundyller, president of Dar-

Poundyller claims the CAD/CAM Foundylier claims the CAD/CAN market will "eventually develop into a data base battle," giving IBM the advantage over other CAD/CAN vendors. "At that point, the CAD capability will have become a commodity and data bases will take on a larger importance, but the data base battle won't be full blown for another year and a half," he says.

and a half," he says.
Such challenges notwithstanding,
the financial markets believe that Intergraph is a valuable investment. A
recent Business Week ranking of corporate market values placed integraph a surprising 15th among U.S. graph a surprising 10th autong U.S. computer companies — ahead of well-known systems vendors Data General Corp., Prime Computer, Inc., Tandem Computers, Inc. and Control

While Intergraph officials ac knowledge that it must beef up its marketing efforts to take on IBM, it also maintains that the low-key. hard-work-pays-off approach has served it well in the past and is not about to be completely abar

It is difficult to disagree. Even though the company has grown to a work force of 5,300 employees, there remains a sense of dedication and a family atmosphere among the work-ors at the Buntaville facility. At the manufactoring plant, workers typi-cally put in a six-day week and often work double shifts.

Founded by James Meadlock in 1860, intergraph's plant now sprawls across several acres in Huntsville. The Meadlock's home sits on intergraph property, Just a few hundred yards from the administration building. Meadlock's wife, Nancy, is second in command at the firm.

Byes though the command with the commany with the command the command that the command the command that the com

cy, is second in command at the firm. Even though the company won't discuss how't it will take on IBM, there are subtle changes under way. The sales force, for instance, which had always been organized geographical-ly, was recently realigned to cover market segments. The goal is to de-velop a sales force that is polished in particular CAD/CAM applications instead of one that is responsible for all market segments.

The company can also rely on a significant installed base of both its own users and Digital Equipment Corp. users in the engineering world. In the early 1970s, the company opt-ed to write its CAD/CAM software See INTERGRAPH page 132

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~ See

Atari readies 20M-byte drive, expansion box for ST micros

Will make ST fully compatible with IBM Personal Computer

by David Bright
WEST NEWTON, Mass. — Since WEST NEWTON, Mass. — Since Jack Transile took over the siling Atari Corp. less than two years ago, the company has launched the moderately successful line of low-priced ST personal computers and has managed to turn a profit. Now, Atari is in the process of readying a 20M-byte hard disk drive as well as an expansion box that reportedly will rake the ST computers fully compatible

with the IBM Personal Computer.
"We are not sitting on our behinds," the controversial Tramlel said during a recent promotional vis-

said during a recent promotional visi-it at a computer store.

According to Tramicl, Atari as-sold 200,000 ST systems since last May, about 30% of those in the U.S. The chief products in this line are the 8799.96 520ST, a 512K-byte randomaccess memory system introduced in January 1985, and the 1040ST, a 1M-byte system that sells for \$990.95. Both so-called "Jackintosh" system use an icon-based user interface similar to that in the Apple Computer, Inc. Macintosh. Tramiel claims that Atari was los-

ing \$10 million per month when he

bought it from Warner Communica-tions, inc., but in the first quarter of 1986 the company showed a slight profit, and in the first quarter of 1986 it achieved \$9 million in net profits. "That proves the formula works," Transie said, speaking of his particular brand of management. "The religion works."

In March at a computer show in Hannover, West Germany, Atari demonstrated a working prototype of the IBM-compatible expansion box, according to Jerry Woloscako, presi-dent of Apex Resources, an Atari dis-tributor based in Brookline, Mass. But before that device is available

Tramiel said, Atari will offer an add-in card that will enable the IBM Personal Computer to run ST programs. But such products, if they ever come to fruition, would not broaden the ST's appeal, said Raymond Palis, a sentor editor at Datapro Research Corp., a market research company in

Deiran, N.J.
"If people want to run IBM PC programs, they will naturally buy an IBM PC or compatible," he said. Falls predicted that Atari ST systems will Delran, N.J. continue to be confined to the "seri ous" home and very small business markets. He said that Tramiel's claimed ST sales of 200,000 "sounds optimistic by about 100,000

so far, more than 300 software So far, more than 300 software packages are available for the ST sys-tems, according to Larry Samuels, Atari's director of computer sales. Approximately one-third of those packages are business-oriented, he

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Mexico City during the dates of the show.

Intergraph poised to take on IBM

From page 131

for DEC hardware and has kept pace with DEC since that time. This move gave it a distinct advantage over Computervision, which based its sys-

Computervision, which based its sys-tems on proprietary hardware, espe-cially in the past few years when hardware compatibility became a major contern to users. Intergraph's first products were based on the DEC PDP line, and it latpassed on the DEC FDF mic, and it has retailored its software to the DEC models in the VAX-11 line by intro-ducing turnkey CAD/CAM systems called the intergraph 730, 750, 780

Those systems are currently being phased out as the company focuses on its Microvax II-based and VAX 8650-based products. The 8650-based product is scheduled for release this year.

Intergraph first moved into the architectural and mapping areas in the early 1970s when other CAD/CAM vendors were focusing on the me-chanical and electrical market seg-

As the sole vendor to the architectural and mapping markets, it was able to establish itself as a CAD/CAM vendor without having to comp

with the major players.

The company has also played a conservative gam and has never ventured into volatile markets, such as the personal computer CAD/CAM arena. It has a clear idea of what it can and cannot do, according

it wasn't until the early 1980s that Intergraph branched out into other markets, such as mechanical and electronic CAD.

"We waited until we had a good product," says John Gridley, vice-president of finance. "Now, a third of our sales come from mechanical, but that's partly from the cooperation of Computervision. They were stubbing their toe just as we were hitting our

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TI countersued by Toshiba

TORYO — Theshin Corp. has filed to against Trens in Struments. Inc., puter the Trens Instruments. Inc., puter that Dallas-based Trivilated shiba's patent on 266K-byte dynder transform-cores memory (RAM) jus. Toshiba said that it is demanda a U.S. court ban on T's manufacting and sales of the chips in the

The suit is being seen as an at-mpt by Toshiba to fend off an earti-suit filed by Ti in Federal District

suit filed by Ti in Federal District suit in Dallas. That suit charged Toshiba and even other Japanese chip makers, schading NEC Corp., with patent in-

announced that it will invest a some of \$416 million in semiconductor pro-duction in fiscal year 1986, 17% less than in the previous year. Company-wide, Toshiba will spend \$722 mil-tal investment in fiscal

Three Japanese firms band to beat KDD overseas telecom monopoly

perceptone and recatable communica-tions, beleconderencing and business data transmission, all at a rate 20% to 30% lower than that charged by the KDD, said a Mitsublehi official. The three trading companies esti-mate that the joint renture will earn \$556 million in the fourth year of op-eration.

ellani

Only Ampex delivers a two year warranty

AMPEX

IBM pricing: Carrot or stick?

may help increase the unit ship-ments, but may not help as much in terms of revenue or profits. The in-crease in IBM's CPU installed base, on the other hand, will automatically lead to greater software revenue.

That will be good for IBM, but it still

The Act of the pool for PIRS, best is sail you are been only for component for any one to enough to component for the pool for PIRS. The pool for th much as its predecessor, MVS/SP, took place late in the first quarter of 1983. About two years later, in March 1985, only 10% of large operating system customers had switched to MVS/XA. Even now.

three years after its launch, only 25.5% of the large IBM users have installed MVS/XA. I believe that the main reason for ch low MVS/XA penetration is its high price, which means that anoth-er substantial MVS/XA price hike at er substantial MVS/XA price hike at this time would make things even worse. A more likely tactic would be for IBM to sweeten the pot for its users through some special market-ing programs, such as one-time dis-

Such a "carrot" approach, however, may still not be enough — which brings us to the possible "stick" tactics big price hikes for the non-XA pr Jucts. The higher prices for older software would help bridge the gap between it and the XA products, thus making it easier to justify the jump, in the end, IBM would win a smaller victory even if a user decidsmaller victory even if a user decid ed not to switch at this time. The company would make more money from its older software.



Xerox Corp. reported that profits for the first quarter ended March 31 fell 11% to \$101 million or 92 cents per share, compared with \$114 million or \$1.06 per share a year earlier. Net income from continuing operations dropped 21%. Revenue grew 4% from \$1.95 billion a year earlier to \$2.02 billion.

Computer Task Group, Inc. reported revenue for the first quarter ended March 31 of \$32.7 million, an increase or \$32.7 million, an increase of 26% over year-earlier sales of \$26 million. Earnings per share grew from 24 to 27 cents, while net income climbed 72% to \$1.3 million.

Corves Systems, Inc. an-nounced a loss for the third quarter ended, Feb. 28 of \$23.3 million, or 83 cents per share, as the firm continued the major restructuring of its business, the consolidation of operations and the layoff of 75 additional employees. A year earlier, Corvus lost \$1.1 million, or 4 cents per share. Revenue for the third quarter fell from \$19.3 mil-lion a year ago to \$11 million. share, as the firm contin

VM Software, Inc. reported revenue for the first quar-ter ended March 31 of \$4.3 million, compared with \$3.2 million a year ago. Profits were \$641,930, or 15 cents per share, compared with \$318,873, or 9 cents per share, in the like period one vear ago.

year ago.

Britton Lee, Inc. announced revenue for the first quarter ended March 31 of \$7.2 million, compared with \$6.5 million in the comparable period a year ago. Profits were \$180,000 or 2 cents per ahare, compared with share, compared with \$938,000, or 12 cents per share, in the like period last

Ungermann Bass, Inc. re-ported net income for the first quarter ended March 31 of 8804,000, or 5 cents per share, compared with a net ioss of 3514,000, or 3 cents per share, in the comparable period a year ago. Revenue for the quarter was 42 12 million in the previous year's first quarter. ٠.

olt Beranek and New-i, Inc. reported net in-e for the third quarter ad March 31 of \$3 million, red with \$2.2 mill compared with \$2.2 million in the same period last year. Earnings per share were 34 cents, a 31% increase from 26 cents reported in last year's third quarter. Revenue for the quarter was \$45 million, up 28% from \$35.3 million reported in the comparable pe-

riod a year ago.

NBI, Inc. reported a loss of \$2.4 milion, or 25 cents per share, on revenue of \$67.6 million for the third quarter ended March 31. This com-with part income of \$4 estoru march 31. This com-pares with net income of \$4 million, or 42 cents per share, on revenue of \$54.6 million reported in the comparable period one year earlier.

Xidex Corp. reported rev

61% increase from \$73.4 million in the like period a year ago. Profits were \$8.4 million, or 20 cents per share, compared with \$6 million, or 16 cents per share, in the comparable period a year

Nashus Corp. announced a 39% increase in profit for the first quarter to \$5.7 mil-lion or \$1.19 per share, com-pared with \$4.1 million, or 86 cents per share, for the same period in 1985. Sales of \$169

million were up 14% from \$147.7 million a year earlier.

VLBI Technology, Inc. re-ported a loss of \$2.2 million, or 12 cents per share, for the first quarter ended March 80, compared with a profit of \$813,000, or 4 cents per share, a year earlier. Reve-nue increased 10% to \$20.5 million from \$18.6 million in the first quarter of 1985.

arex Corp. reported ne for the first quar-

ter ended March 2 of \$6 million, or 53 cents per share, on revenue of \$44.7 million. This compares with net in-come of \$4 million, or 44 cents per share, on revenue of \$44 million reported for the first quarter last year.

Systematics, Inc. report-ed revenue for the quarter ended Feb. 28 of \$31.6 miltion, compared with \$24.4 million in the comparable period last year. Profits for the



ed with \$12.2 ious year. Profits sillion, or 27 cents compared with net income of \$788,450, or 2 cents per share, on revenue of \$20.4 million for the quar-ter ended Feb. 28. This com-pares with net income of \$84,477 on revenue of \$18.6 on in the com

second quarter ended March 16 of \$42.65 million a 42.65 million, compared with \$42.7 million in the corresponding period a

year ago. Profits for the firm were \$1 million, or 5 cents per share, compared with \$3.5 million, or 18 cents per share, in the same period a

Tektronix, Inc. reported net income for the third quarter ended March 8 of \$15.6 million, or 79 cents per share, on revenue of \$384.6 million. This compares with net income of \$24 million, or \$1.17 per share, on revenue of \$421.2 million in the com-

Decision Data Compu orp. announced revenue for the quarter ended Feb. 28 of \$45.1 million, compared \$43 million. \$45.1 million, compared with \$43 million in the same quar-ter last year. Profits were \$967,000, or 1 cent per share, compared with \$2.6 million, or 32 cases are seen to the same compared with \$2.6 million,

or 32 cents per share, a year Trilogy Ltd. reported a preliminary fiscal 1985 loss of \$46.2 million, or 79 cents per share, compared with a fiscal 1984 loss of \$88.9 million, or \$1.52 per share. Revenue, which included that of Exzi, the computer misured that of expression of the computer misured at \$25.6 million, compared with \$30.3 million restated to include Exxi for fiscal 1984.

Information Science, Inc. reported net income for the third quarter ended Jan. 31 of \$106,900, or 2 cents per share, on revenue of \$4.5 million. This figure comparativith a net loss for the fiscal year 1985 third quarter of \$6.2 million, or \$1.22 per share, on reported revenue of \$8 million.

The Plessey Co. announced third-quarter results for the quarter ending Dec. 27 and declared an interim dividend for the 1985-86 fiscal year. Third-quarter earnings were \$36.9 million; compared with \$30.7 million

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the previous year.

Revenues for the fourth quarter were \$42.3 million, compared with \$32.9 million a year earlier. The company reported a net loss of \$12.8 million, or \$1.17 per shar compared with net income of \$6.2 million, or 64 cents per share in the like period a year earlier.

Gandalf Technologies, Inc. reported revenue for the second quarter ended Feb. 1 of \$25 million, company with \$25. of \$25 million, compared with \$20.1 million in the like period a year earlier. Profits were \$646,000, or 6 cents per share, compared with \$870,000 or 9 cents per share s year.

Zenith Electronics Corp. reported a loss for 1985 of \$7.7 million, or 33 cents per share, compared with earnings for 1984 of \$63,6 million, or \$2.88 per share. Rev. lion, or \$2.88 per share. Rev-enue for the year was \$1.62 billion, compared with \$1.72 billion in the previous year. Revenues for the fourth quarter were \$484 million in both 1985 and 1984. Profits

both 1985 and 1984. Profits for the quarter were \$3.6 mil-lion, or 16 cents per share, compared with \$11.3 million, or 51 cents per share in the same period a year earlier. same period a year earner.
Computer products sales
in 1986 were \$362 million, up
41% from \$249 million in
1984. Unit sales of computers
increased in every quarter of
1985, compared with both
the preceding quarters and
the same quarters in 1984.



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Businessland surges ahead

From page 158

stest growing businesses in the

cus some Businessiand customers, however, believe that growth has come at the expense of the large-user quality of service that Businessiand likes to claim. At Visa International in San Mateo, Calif., Chief Financial Officer Tom Cleveland abandoned Businessland after he and his staff saw a decline in technical support.

"Initially I thought they were a class operation," Cleveland told Computerworld. "But then their Computerworld. "But then their technical support started to deteriorate. They had new people working in there every 90 days. Now we're looking for another company that can support us in what we need," he added.

Large-volume purchases
Some of Businesaland's competition attribute its success to large-volune purchases and heavy discounting. "In most of the markets they'se
gone into, they've attempted to ye
their way in," says Tony Morris,
president of Morris Decision Systems, Inc., a New York-based retailer,
"Businessland is driven by saidthey're trying to get to a certain
scale. They're trying to by the ortain scale. They're trying to buy in larger volume so they can lower the price and buy market share in the markets in which they go and drive competi-tors out. I'm not judging it; that's sim-ply what they're trying to do."

Nonetheless, some large data pro-ressing organizations find that Businessiand offers services that other sinessiand offers services that other over-the-counter-oriented chains do not. In 1985, 66% of Businessiand's sales went to companies with more than 1,000 employees, according to Alice Brown at Future Computing. Walk-in customers accounted for only 30% of Businessland sales. The Arizona state treasurer's of-

The Arizona state treasurer's of-fice has been buying IBM Personal Computers, PC software and networking equipment from Busin-essland's Phoenix store since June 1984. The state wanted a personal computer network to track receipts and disbursements and perform cash management and investment track-ing for a \$1.4 billion portfolio.

Although the treasurer's office

Although the treasure's office and the technical expertise to design the network, it turned to the retail chain for assistance. "We wanted all these different pieces of equipment amay of which we had never present any of which we had never present the same of the same o

kind of action from a cash-and-carry vendor, he says.

While many of those types of stores are long gone. Businessland just gets bigger. The films of the stores are long some films are to make a store and the store that the store of the store that the store of the store that the store of th

It is natural, then, that Torrest turns to his passion for fast cars when he describes Businessland's

fast growth.

"We have had to constantly monitor our performance when we stepped on the accelerator," he says.

"You've got to take your curves as

fast as you can with The combination of Torresi, the former director of Olivetti Corp. a Advanced Technology Center, and Norman, an aggressive marketing type, makes for one of the strongest management teams in the retail busi-

Within months of the chain's 1982 founding, the pair raised about \$23.5 million in venture capital to launch 13 stores in California, Arizona and Texas. In December 1983, Business-

land went public with a \$50.2 mi initial public offering. The com-turned its first profit in the De

able ever since.

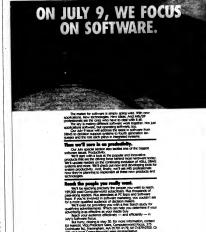
For the quarter ended March 31, 68 Businessland stores posted a profit of \$1.5 million on sales that climbed 31% from year-earlier re-

ults to \$100.7 mil

Torresi and Norman say they envi-sion Businessland as a national chain signed to serve large corporate cus mers in all major metropolitan ar tomers in all major metropolitan areas. This month's acquisitions could be just the first of several this year for Businessland, whose original charter of opening two new stores a month was thwarted when IBM annual to the control of the country o nced a moratorium on new authosinessland must keep closer tabs on-its growth. "The biggest challenge facing the company is managing the business," Preston notes.

"Seventy-two new stores is a lot to "sallow," says Future Computing's rown, referring to the Amerisource ad MBI acquisitions. "It could be a od MBI acquisitions. "It could be a stential problem for them, but it all spends if they go slowly in bringing

aiready the company could be ahowing some signs of strain. Shortly after merger plans with Amerisource were announced this were announced this month, Busin-essland President Ron Watkins resigned after only six months with the company. Although Torresi said Watkins' resignation and the acqu were in no way related, there were rumors about Watkins disagreeing with Norman's management style.



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CDC. The industry slump contin d to hinder CDC's efforts to recov pite its restructuring and cost eduction measures, the Minneapolis rm's computer businesses lost \$42.6 illion, compared with an \$11.5 mil-

illion, compared with an exm loss a year ago. Computer reveue dropped 10% to \$796.1 million.
A tenfold increase in year-to-year
rofits to \$21.4 million for CDC's

Condit Configuration are profits to \$21.4 million for CDC's Commercial Credit Co. financial ser-vices unit cushioned the effect on the bottom line. CDC reported an overall es of \$21.2 million, or 52 cents per

loss of \$21.2 million, or 52 cents per share, compared with a \$9.2 million, 24 cents-per-share loss a year earlier. "I don't think demand has picked up as much as they thought it would," Easterbrook said. "I don't expect CDC to be profitable for at

East the next two quarters."
Easterbrook predicted that CDC will sell its Ticketron automated ticketing service within the next month for about \$160 million, as it attempts to raise \$383 million to meet shortbt obligations by the end of

DG. The minicomputer vendor re-orted a \$2 million operating profit, but a \$3.8 million one-time loss from redemption of debentures put it in the red for its second fiscal quarter also said that it will lay off 75 em-

Prime. As it predicted earlier |CW April 71, the Natick, Mass., minicom spril 7), the Natick, Mass., maneom-puter maker, after resisting the dump in 1985, reported a 23% earn-ngs drop. President and Chief Exec-tive Officer Joe M. Hegson said Prime will "cautiously approach the remainder of 1986."

Harris. The Melbourne, Fla., firm.

Harris. The Melbourne, 13a, 11rs, which had predicted a 25% earnings decline for its third fiscal quarter [CW, April 14], possed an 11% drop to \$15.3 million, or 38 cents per share. But sales dropped 10% to \$61.7 million. President and CEO John T. Hartley said Harris posted a loss in its chip business, modest earnings.

uters, Inc. and Stratus Con putern, inc. and Stratus Comput-nc. posted earnings gains of 81% 39%, respectively. "The underlying demand for on-line transaction processing technology hasn't suf-

Condisco, Inc. The independent easing industry leader doubled its profits on a 64% revenue increase. The IBM Sierra market was not as

strong as they expected, but they did strong business in 3080 series ma-chines," said Drexel Burnham Lambert, Inc. analyst John Keefe. Keefe said Comdisco has increased its work force 25% to 850 employees in the

First Software seeks protection

Software's ability to repay its credi-"As I understand it, they have

en cut off by a number of vendors. so it is going to be pretty tough to survive," said Abraham Poznanski, president of Computer Associates, Inc.'s Micro Products Division, a firm which First Software

They have always cut corne and been slow payers, which is fine That was their strategy in the mar-

Pirst Software's major creditors ware vendors, led by Lotus Develop ment Corp., which is owed \$1.4 mil-lion. First Software reportedly tion. First Software reportedly accounted for about 16% of Lotus

Other firms owed by First Software, according to the bankruptcy petition, include Micropro Internapetition, include militon; Satellite Software International, \$761,000; Software Publishing Corp., \$479,000; and Multimate International Corp., now a subsidiary of Ashton-Tate,

Pirst Software made it clear that it was interested in investors or pot tial buyers but was not interested in the bid by Solitaire

Solitaire claims to have a one option to acquire 50% of First Softbyces at its Sunnyvale, Calif., semi-nductor plant and move to buy at of its customer-specific chips

rnings in information systems a flat earnings from government sales Fault-tolerant vendors. Tander

red from the slump," said Omri Ser-n president of Itom International, a lin, president of Itom Internatio

ware stock from the venture capital-ist firm Dinavest Ltd., a UK corporaoccupies offices that Washington, D.C.

A key issue that Solitaire is fight-

ing to exercise is Dinavest's voting rights. As part of the agreement wih Dinavest, Solitaire was given 51% of the voting rights of First Software formerly controlled by Dinavest, Martin-Musumeci said

However, Pirst Software, along with Pawas T. Farouki, the president and sole shareholder of Dinavest, is sputing the validity of Solitaire's

"Solltaire is, in the opinion of nunsel and us, a dead issue," Faulk

that expired, and they fully ond stand that it expired. It was about a

four-day option,and it expired last The management of Dinavest is lit over the issue of who controls Pirst Software. "As far as I am concerned, Solitaire has acquired the proxies for one year from Dinavest and controls 51% of First Software, d Shukri Ghalayini, executive

vice-president of Dinavest, who signed the agreement with Solitaire and is one of eight members of the est Software board of directors Although Solltaire's current goa is to gain control of First Softwa

Solitaire may look to sell First Soft-ware if it gets control. "Once things are stable, we may pass the baton on to a larger company that is more ap-propriate to be in this business," Martin-Musumeci said.

Analysts remain bearish despite latest Wang releases



espite promising activity on the product front, Wang Laboratories, Inc. -17%) still causes analysts to question the company's nearang's recent introdu

VS 5 and VS 6 low-end minicom ers, as well as the new release of its VS 300 operating system designed to solve prior software problems, stirred hopes among some analysts that the company would gene more high-end sales and significantly improve its bottom li

"But I'm nervous about Wang ht now," says Thomas E. McCrann, a vice-president with Merrill Lynch, Pierce, Penner and Smith, Inc., "because of the com-puter industry's ongoing weakner This is not the kind of environme for a pickup in business.

Indeed, when Wang posted its March quarter earnings of 14 cents a share, it admitted difficult indus try conditions would impact profit margins at least through the end of its fiscal year, ending June 30, 1986. Such news caused the stock

to drop 1% points to 17.

Although the recent resignation of J. Carl Mass, Wang's former executions. utive vice-president of sales and marketing, caused an earlier price turmoil is not the key issue, most rsts say.

The key issue is Wang's product momentum, according to John Lev-inson, an analyst with Goldman, Sachs & Co. He currently recom

Porteus is president of Str Research Associates, a Centerville Mass-based company that provides customized research services for fi-nancial and high-tech firms.

mends purchase of Wang because the company's recent and forth-coming product introductions will

begin to satisfy pent-up demand in the company's large, productstarved installed ba If Wang can make its installed se happy." Levinson says, "then

from an investment standpoint, the stock will work out very nicely. Levinson estimates Wang will earn 60 cents a share this year and \$1.40 a share in fiscal 1987. Craig Symons, an analyst with

Gartner Securities, agrees that Wang will perform well if it satis-fies its installed base. "But it's just incredible how overwhelmingly negative user response is to Wang." Symons says. He bases this impresversations with focus groups and numerous large Wang acco across the country. ding to Symons, Wang has

a "lousy" reputation for service, support and getting products to market. Purthermore, he argues, the company has lost credibility as a serious data processing vendor, owing to undiagnosed bugs in its flagship minicomputer, the VS 300. e of the disenchantment he sees in Wang's installed base and the company's formidable data p cessing products competition, Sy-mons estimates Wang will earn 50 cents a share this year and 75 cents a share in fiscal 1987.

To dispel customer concerns, Wang "clearly needs to roll out a wang clearly needs to that a number of new products on time that are fully functional and that require very little fix," Merrill Lynch's McCrann says. "There are still true believers who are going to stick with Wang no matter wh According to McCrann, the

stock's current price levels are sus tained by investors who believe that when "Wang's business turns on, it will turn on quickly." However, Gartner's Symons cautions, nd is a lot further out than I think most people real-

Revenues up, losses down as MSA enjoys 'surprisingly strong' quarter

By James A. Martin
ATLANTA — Management Science America, Inc. (MSA) last week said its operating revenue for the first quarter ended March 31 was \$29.4 million, compared with \$25 million for the year-earlier quarter. The company reported a net loss of \$410,000, compared with a net loss in first-quarter 1985 of \$2.7 million. These figures confirmed first-quarter mates released earlier this month

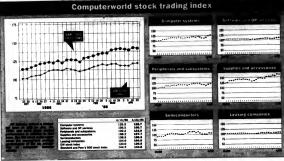
'It is a typical pattern for MSA to lose a significant amount of money in the first quarter," said Brian Mutert, software analyst for Robertson, Colman and Stephens in San Francisco

sees its highest sales at the end of the calendar year, followed by a slow-down in the first quarter, he said. MSA's increase in revenue and smaller-than-usual loss resulted in a 'surprisingly strong" first quarter, Mutert said. He cautioned, however, that is was too early to "boast of any significant change in their business

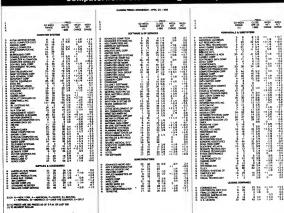
CORRECTIONS

\$13.1 million in the fiscal year ended in March 1985, and its project man-agement software for microcomputers is named Superproject





Computerworld stock trading summary



Source Trade Courses, Inc.

COMPUTER INDUSTRY

Low-profile Inter-graph takes on IBM in CAD/ CAM/131

ramiel says Atari won't sit still/132

Toshiba countersues Texas Instruments and cuts back chip produc-

tion/134 MSA reports its traditional firstquarter loss/156

NSTANT ANALYSIS

"Ouotron Systems, Inc.'s stock holdings are now concentrated in the arbitrage crowd, which

makes a takeover by Citicorp or someone else a high probability."

— Charles E.
Taylor Ir.,
Productiol Backs

Businessland surges ahead

Recent acquisitions to add 72 stores to thriving chain

By Messes Medianesy
SAN JOSE, Calif. — Enzo Torred has a
passion for race cars. So it's not surprising
that the senior vice-president
and cofounder of Businessiand,
Inc. pilota his company just like
his Porsche — at breakneck

But brash, aggressive corpo-rate style is no guarantee of suc-cess in a computer industry mar-lest that saw 400 of 4,600 retail

ket that saw 400 of 4,600 retail stores go out of business last year, according to Dallas-based Frazo Resure Computing, Inc. Analysts say that by concentrating on providing corporate customers with value-added service, including hardware and software including hardware and software installation, training and service, Business-

that, during the retail boom days, were busy pushing boxes out the door. "Businessland's strategy has not

"Businessland's strategy has not changed, They have always focused on the strategy and the strategy has not changed. They have always focused on the sales force and the product line," says Michele Preston of L. F. Rothachlid, Unterberg Towbin, "Businessland started that

'yay; now everyb sing in that direction."

Since cofounders Torrest and former Dataquest, Inc. President David Norman opened their first

David Norman opened their first Businessland store in San Jose in November 1982, Businessland has become one of the fastest growing computer chains in the U.S. Today the public company has annual saies of \$350 million at \$00 locations nations/de

has annual sales of above muchos
sales increased 122% during 1986, from
\$18.79 million in 1984. The company has
been cited by both fac. magazine and the
San Francisco Chronicle as one of the
See BUSINESSLAMD page 137

First Software files for protection

By Douglas Berney
METHUEN, Mass. — First Software
Corp., once a high-flying microcomputer
software distributor, last week filed for protection from its creditors in what some term a defense against a takeover attempt by Solitaire Corp., the controversial Hay-ward, Calif.-based holding company that was awarded a 20% equity in Computer-

was awareed a 200 educty in composi-land, inc. last year.

The fate of First Software, which filed under Chapter 11 of the U.S. Bankruptcy Code on April 19, now lies in a tangle of ice gal maneuvering that could take weeks unravel. First Software's debta total \$32

million, according to the filing.
Sources close to Solltaire said that if Solitaire succeeds in taking control, Solitaire President John Martin-Musumeci will replace First Software's four top execu-

tives, including President Rick Faulk, with a new management team headed by former Bendix Corp. chairman William Agee. First Software had been one of the maor success stories in software distribu tion, with sales that rose from only \$5.6 million in calendar 1983 to \$61.7 million in

1984 and \$130 million last year. The firm was No. 3 last year on the Inc. 500 list of the fastest growing private companies in

the U.S.
But First Software's aggressiveness in pricing and delivering software was its own worst enemy, allowing the firm to pile up more than \$30 million in debta. And in a catch-22 situation, First Software fell behind in payments to software vendors, which then refused to ship more products except on a prepaid basis, cutting off First



USTRY INSIGHT

IBM pricing: Carrot or stick?

espite a reintively slow start, IBM's latest and most expen-sive operating system, MVS/ XA, promises to contribute about 33% of the company's U.S. mainframe software revenue this year. Only its older cousin, MVS/SP, is likely to produce more revenue (36% of the total) for IBM in 1986. By the end of 1987, however, MVS/XA is likely to become solidly en-MV8/AA is likely to become solidly en-trenched as IBM's most important oper-

ating system ating system.
Thus, my long-range forecast for IBM has the software accounting for more than 19% of IBM revenue in 1990. More important will be the software's contribution to IBM gross margins (about 90% of the need). (about 26% of the total in 1990). Such growth implies compound annual in-creases of about 30% over the next five years, making the software IBM's fast

est growing bus An understanding of IBM's business options is particularly important in the current business climate of slower growth, for that's when some of the ajor trend changes can be expected There are a limited number of options, however, which can work successfully First, IBM must try to price its hard ware products more aggressively in order to work off excess inventories, just

as it did in February. The lower prices

Djurdjevic is a computer industry analyst and president of Annex Re-search, a Phoenix-based computer research and consulting firm

Sluggish mainframe demand evident in first-quarter results

Burroughs, CDC, Amdahl still mired

By Clinton Wilder Sluggish U.S. demand for main-frame and minicomputer systems continued to be evident in first-quarter financial results released last ter financial results released last week. Although leading players in computer leasing and fault-tolerant systems reported strong earnings, the lingering industry slump meant lower profils for Burroughs Corp., Amdahl Corp., Harris Corp. and Prime Computer, Inc. and continued lesses for Control Data Corp. and

Ds ta General Corp Data General Corp.
Recent surveys of overall computer spending have predicted only a 3% to 5% increase in expenditures in 1986, according to Kidder, Peabody & Co, analyst William Easterbrook.
"Aggregate demand is still lossy,

don't get one by July, earnings will not improve much this year. A lot of these companies are betting on a good second half, but I don't see it."

good second hair, out 1 don't see it.
Leading companies reporting results for the quarter ended March 31
were the following:
Burrongha. Chairman W. Michael
Bunenthal echoed similar pessimism in a statement on the Detroit firm's first quarter, when earnings irm's first quarter, when earnings fell 66% from year-earlier results to 35 cents a share and revenue dropped 3%. Most analysts expected per-share earnings of about 50 cents, but an estimated \$20 million pretax loss by the firm's Memorex Corp. per-ipherals unit had a section impact. erals unit had a serious impact.

predict with any certainty" that it predict with any certainty" that it will show year-to-year earning growth in the second quarter. A spokesman said first-quarter orders for the new A series mainframes and Ses \$LOW page 156

Company	Net Income Jan. Morch, 1986 (thousands of dellars)	Percent Change From 1985	Jan. Horch, 1964 (thousands of dellars)	Percei Change From 18
- A- 16		P - 1	A	100
AST Research	6.407	+10	41,518	+10
1 6	750 et	7.76		
Correlleco	16,376	+100	227,103	+64
	SOUL PROPERTY.			-
Cray Research	30,862	0	142,021	+20
	By 16	7.0	1 4 7	
Gould	14,800	-18	341,600	-2
			200	
Prime	9,250	-23	196,821	+12
THE	-		-	
Tandem	12.410	+81	176,327	+20

SoftScript

SoftMail

Election We are a

STORM Individual Real is the conjugate of the conjugate o

SoftMenu

SoftPlan

System SoftAccess

SoftQuery Inquery and

MFAST Screen Definit 200 Management DATAPACKER

Continue Data

HOTT.

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nces are you do. And if you're thinking of buying a modern, consider the Half Card." Because of its small size, the Half Card the Half Card" fits in more computers, including all of the models we've listed re. The Half Card" is small, so it fits in short slots or long. That means you can save your long slots for other expan-

ortioss Communication

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